NOSC TD 1209
Volume 1

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NOSC TD 1209
Volume 1

Technical Document 1209
Volume 1
January 1988

Antenna Heights for the Optimum Utilization of the Oceanic Evaporation Duct

Part I: Results from the Pacific Measurements
Part II: Results from the Key West Measurements

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ADMINISTRATIVE INFORMATION

This reissue of Naval Electronics Laboratory Center (NELC) Technical Notes 2031, 2371, and 2569 was funded by the Office of Naval Technology, Arlington, VA 22217. The authors are currently members of the Marine Sciences and Technology Department, Naval Ocean Systems Center, San Diego, CA 92152-5000.

Released by
H.V. Hitney, Head
Tropospheric Branch

Under authority of
J.H. Richter, Head
Ocean and Atmospheric
Sciences Division

LH

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NOSC TD 1209, Vol. 1	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Naval Ocean Systems Center 6b. OFFICE SYMBOL (if applicable) Code 54	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code) San Diego, CA 92152-5000	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Office of Naval Technology Office of Chief of Naval Research 8b. OFFICE SYMBOL (if applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code) Arlington, VA 22217	10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO	PROJECT NO	TASK NO	AGENCY ACCESSION NO
62435N	N01A	RA35G80/ RU35G80	DN888 715

11. TITLE (include Security Classification)
ANTENNA HEIGHTS FOR THE OPTIMUM UTILIZATION OF THE OCEANIC EVAPORATION DUCT
Part I: Results from the Pacific Measurements
Part II: Results from the Key West Measurements

12. PERSONAL AUTHOR(S)
J.H. Richter and H.V. Hitney

13a. TYPE OF REPORT	13b. TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
	FROM ______ TO ______	January 1988	222

16 SUPPLEMENTARY NOTATION
Volume 1 of 2, first published as informal working documents with limited distribution, (NELC Technical Notes 2031 and 2371), has been reissued as a formal NOSC Technical Document approved for unlimited distribution.

17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Evaporation ducting Propagation

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

Extensive evaporation ducting measurements were conducted over a period of 1 year in the Southern California offshore area and for 2 weeks between Key West and the Marquesas Keys. The purpose of the measurements was to provide data for model validations and to determine if existing climatologies could be used for estimating the probability of occurrence for evaporation ducting conditions.

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL J.H. Richter	22b. TELEPHONE (include Area Code) (619) 553-3053 22c. OFFICE SYMBOL Code 54

DD FORM 1473, 84 JAN

83 APR EDITION MAY BE USED UNTIL EXHAUSTED
ALL OTHER EDITIONS ARE OBSOLETE

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FOREWORD

In the early 1970s, a series of extensive evaporation ducting measurements was conducted in different ocean areas. The purpose of the measurements was to provide data for model validations and to determine if existing climatologies could be used for estimating the probability of occurrence for evaporation ducting conditions. Both objectives were successfully met and documented in Naval Electronics Laboratory Center (NELC) Technical Notes 2031, 2371, and 2569. (NELC was a predecessor of the Naval Ocean Systems Center.)

Technical Notes carry a limited distribution statement and cannot be referenced in documents approved for unlimited distribution. Because the information in Technical Notes 2031, 2371, and 2569 is still extensively used, the Technical Notes have been reissued in this NOSC Technical Document approved for unlimited distribution. As a formal, Center-approved publication, this Technical Document can be referenced.

This reissue is presented in two volumes. Volume 1 presents Part 1: Results from the Pacific Measurements (formerly NELC TN 2031) and Part II: Results from the Key West Measurements (formerly NELC TN 2371). Volume 2 presents Part III: Results from the Mediterranean Measurements (formerly NELC TN 2569).

Part I: Results from the Pacific Measurements

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SUMMARY

A series of carefully controlled radio propagation measurements were performed over a period of one year in the Southern California off-shore area. The purpose of the measurements was to determine antenna heights for optimum utilization of the radio propagation properties of the oceanic surface evaporation duct. Over water radio propagation links with vertically spaced antennas were operated in the frequency range from 1 - 10 GHz at 19 nautical miles over-the-horizon paths. It was found that for L- and S-band frequencies the highest antenna virtually all the time receives the highest signals (or, what is the same, gives the longest detection ranges). For X-band stronger signals are received 10 percent more often on the low sited antenna (15 feet above mean sea level) compared to the high antenna (65 feet above mean sea level). About five percent of the time the lower antenna receives signals which are 6 dB stronger than those received by the higher antenna. It seems unlikely that a cost effectiveness analysis based on those percentages would justify addition or relocation of ship board radar antennas.

I. BACKGROUND

A persistent atmospheric phenomenon found over oceans is a low level duct just above the water surface. It is caused by evaporation and produces a refractive index profile decreasing with height. This duct has a significant influence on microwave radio propagation and its effect has to be taken into account for accurate radar coverage and microwave communications predictions. Under extreme conditions this duct can virtually trap all microwave energy and act as a waveguide. It is tempting to exploit such a capability, for example over-the-horizon detection of small surface targets. For maximum utilization of this capability one would like to know how existing antennas perform under various ducting conditions and if there is an optimum antenna height for use on board ship. Relocation or addition of antennas on board ship is, of course, a question of far reaching consequences both from an engineering and an economical viewpoint. Those implications put a special demand on a program that investigates microwave propagation in the oceanic surface evaporation duct. Quick conclusions drawn from spotty measurements could have disastrous consequences. Only comprehensive and thorough measurements combined with sound theoretical interpretations can provide the data needed as an input for cost-effectiveness studies which determine optimum utilization of the surface evaporation ducting phenomenon.

II. OBJECTIVE

Conduct a series of well controlled measurements in an ocean environment which provide a basis for a statistical judgment of the relative performance of high and low sited antennas. This necessitates measurements over extended periods of time in different seasons and geographical areas. The present report covers the findings in the Southern California off-shore area.

III. APPROACH

In order to represent most closely open sea conditions, one would prefer to conduct measurements from aboard ship. Ideally, one would like to use one radar for each frequency under investigation, switchable to antennas at different heights and track calibrated targets continuously. This would require a dedicated ship, special radars calibrated and modified to permit continuous recording of the radar returns from calibrated targets. The cost of such measurements would be tremendous and funding for such an exercise would be difficult to obtain. A compromise approach seems to be in order which gives data of sufficient quality to draw sound conclusions at reasonable cost. The most important consideration, of course, is the quality of the data. Tracking targets of opportunity with unknown and highly aspect-dependent cross-sections could produce misleading data. Using unmodified radars located at different shipboard heights (maybe even operating at different frequencies) will not provide reliable data. With these considerations in mind, it was decided not to involve ships for the basic measurements. The substitute most closely resembling open sea conditions is a propagation path between two islands. A low sited transmitter on one island radiates several frequencies simultaneously and continuously. Vertically spaced antennas on another island receive the signals. For each frequency only one receiver is used which sequentially is switched to the different receiving antennas. This eliminates the need for careful calibration of the critical active components in the system. The significant features of the concept of using a propagation path between two islands are:

1. Open sea conditions are closely simulated by islands sufficiently removed from land influence.
2. Variation of target cross-section is eliminated by using a one way propagation path.
3. Precise antenna adjustments are possible as both terminals are on a fixed platform.
4. Continuous and long term measurements are easily achieved with minimum involvement of personnel and equipment.
5. Only passive components are switched at the receiver site minimizing calibration uncertainties.
6. Compared to measurements involving ships the island measurements are inexpensive and oppose little logistic problems.

A. Selection of Propagation Path

Results from extensive previous measurement programs show the possible influence of elevated refractive structures on propagation data. In particular, for long propagation paths this influence becomes more pronounced. Figure 1 illustrates this effect for a variable 9.6 GHz propagation path. In this case, the transmitter was mounted on a small boat at a height of 15 feet while the receiver remained at a fixed height of 120 feet. In figure 1a, path loss is plotted as a function of distance for the boat moving away from the receiver to a maximum distance of 54 miles and then returning. Up to distances of approximately 40 miles, path loss as a function of range behaves as expected (diffraction being responsible for the slope in the curves out to some 26 miles and tropospheric scatter for the slope from 26 - 40 miles). Beyond 40 miles path loss unexpectedly decreases. The explanation of this decrease in path loss or increase in received field strength can be found from the refractive index profile measured with a sounding balloon as shown in figure 1b. A refractive layer is responsible for bending rays back to the ground as illustrated by the ray trace picture of figure 1c at about the distance where the measured path loss decreased. Elevated layer structures may refract radio rays downward and thus create a "skip zone" in which there is no effect from the layer. The length of this skip zone increases with the height of the refractive layer. This is the reason that the influence of these layer structures increases with the length of the propagation path. For our present investigation in which we are concerned with the effect of the oceanic surface evaporation duct we want to avoid excessive contamination of our results by atmospheric refractive structures other than the oceanic duct. Therefore, we want a propagation path that is not too long. On the other hand, we are only interested in over-the-horizon propagation paths which requires a minimum distance. For the terminal heights under consideration (15 feet for the transmitter, 65 feet for the highest receiving antenna) the shortest path length to be just beyond the horizon is 15 nautical miles. Two suitable islands in the Southern California off-shore area are San Clemente and Santa Catalina islands. Figure 2 shows their relative location and the location of the terminals. The path length of 19.3 nautical miles fulfills the previously discussed constraints. Both islands are removed sufficiently from the mainland that the propagation path selected can be considered to be representative of open sea conditions.

B. Equipment

A block diagram of the transmitting system is shown in figure 3. One oven controlled crystal oscillator phase locks three solid state microwave oscillators at L-, S-, and X-band frequencies respectively. These signals are combined in a triplexer and radiated by a 3 foot parabolic reflector having a log periodic feed. The performance characteristics for the transmitter are listed in table 1.

Band	Frequency GHz	Radiated Power dBm	Antenna Gain in dB	Antenna Beamwidth degrees
L	1.0426	25	12	20
S	3.0075	17	26	8
X	9.624	12	32	3

Table 1. Performance characteristics of transmitter

The mode of transmission is continuous wave and unmodulated for all three frequencies. The power requirements are 28 V, 0.25 A for the crystal oscillator and 20 V, 0.7 A for the microwave sources. The power requirements are low enough to be supplied by regular automobile batteries for two week measurement periods. Figure 4 shows the complete transmitter at its location on Santa Catalina Island. The antenna height is 17 feet (5.6 m) above mean sea level.

A block diagram of the receiving system is shown in figure 5. Vertically spaced receiving antennas are sequentially switched to the triplexer which separates the three frequencies and feeds them into their respective receivers. The receiver intermediate frequency bandwidth is 2 kHz and the receiver automatic gain control voltage is recorded on strip chart recorders. The recording interval for one antenna is five minutes after which the timer switches to the next antenna. Special attention is given to frequent calibrations. Separately generated and carefully calibrated signals are applied to the triplexer. Figure 6 shows the antenna arrangement for the November 1971 measurements. The antenna heights are 16, 32, and 64 feet above msl. For the July measurements only two antennas were used at 9 feet and 63 feet above msl.

For X-band, the antenna beamwidth is only three degrees. This necessitates a very careful antenna alignment. An electrical alignment is not considered sufficient because of high signal fluctuation. The alignment of both transmitting and receiving antennas was done with theodolites using survey points. The accuracy of this alignment is considered better than one-half of one degree.

IV. RESULTS

A. Boat Measurements

Previous measurements for variable path lengths used a small boat carrying the transmitter and a shore-based elevator-tower assembly for the receiver as described in reference 1. These measurements were performed over a period of six months. Data obtained at distances of 19 nautical miles are shown in figures 7-9. In these figures, path loss is plotted versus 18 separate trips for three different antenna heights at 15, 75, and 122 feet. Path loss values of consecutive trip numbers for each of the antenna heights are connected for illustration purposes only. The horizontal dashed lines are the calculated diffraction losses for the three antenna heights (lowest line belonging to the low antenna etc.). Figure 7 shows the L-band data (data of trip number 2-6 are missing due to equipment failure). In all cases, the signals received with the higher antenna are stronger than those with the next lower antenna. The much higher signals on trip number 8 are due to a Santa Ana condition in which dry desert air moves over the water and often leads to dramatic ducting conditions. Such occasional drastic ducting conditions are not unique to the Southern California coastal area. They can be found at other oceanic areas close to or surrounded by desert land masses (e.g. the Mediterranean). The strong ducting encountered on trip number 8 caused higher signals to be received on the middle antenna than on the high antenna for S-band, as shown in figure 8, and a complete reversal, that is, the highest signal on the low antenna and the lowest on the high antenna for X-band in figure 9. For S-band, on all other trips signals increased (or path loss decreased) with antenna height. The measured values for S-band frequently are lower than the calculated values due to diffraction. In comparing the theoretically calculated lower limits with the much smaller measured data one has to remember that for the calculation of the diffraction loss a so-called standard atmosphere is assumed. Subrefractive conditions will cause an increase in the loss. Some of the values in figure 8 appear to be too low to be explained by this interpretation. However, even if there is some doubt in the absolute path loss values for S-band, this is of no consequence for the major present concern. The evaluation of the relative performance of vertically spaced antennas is independent of the magnitude of the received fields.

Figure 9 shows the measurements for X-band. For two trips (number 8 and 12) signals decrease with antenna height. In those cases one would have longer detection ranges using a low sited antenna.

Obviously, the number of data points presented in figures 7-9 does not permit one to draw statistically sound conclusions. However, the findings from figures 7-9 are consistent with those from the island measurements. The island measurements avoided two shortcomings of the boat measurements; they provided a large sample of continuous data and eliminated possible contamination from land influence by placing both terminals of the propagation link away from the mainland.

B. San Clemente - Santa Catalina Measurements July 1971

In July 1971, a ten day measurement was conducted using a transmitter height of 17 feet on Santa Catalina Island and receiving antennas at 9 and 63 feet on San Clemente Island. The data are presented in a format considered to be most useful as a basis for evaluating optimum antenna heights. Figure 10 shows the logarithm of the ratio of the signals (or equivalently the path loss difference) received with the high and the low sited antenna respectively. The ordinate value is zero for equal signals on both antennas. Positive ordinate values indicate higher signals on the higher antenna and negative ordinate values higher signals on the lower antenna. The abscissa shows two rows of numbers. The first row indicates the time of day ("12" is noon and "0" midnight) and the second row the date in July. Figure 10 indicates consistently higher signals on the higher antenna except for a few brief periods in the first three days of the measurement period. The kind of presentation in figure 10 has an added advantage that one does not even need to know the transmitter power. It cancels when the ratios are formed. However, the absolute power levels are of considerable interest for other considerations and are shown in the form of path loss in figure 11. The dashed lines indicate calculated path loss values for free space propagation and diffraction. Both are not limiting values and are occasionally exceeded by the measured signals. Figures 12 and 13 show the amount of fading measured for L-band. The lower antenna did encounter both higher average and absolute fading values. The information of figures 10-14 is presented in tabular form in table 2.* This format should be most helpful to a systems designer who is faced with the task of making cost-effective antenna siting decisions. The first block of numbers in table 2 gives the percentage of time signals received on the higher antenna exceed the signals received by the lower antenna by a certain value in dB. This information is absolutely necessary if one considers costly relocation or addition of other antennas. Only the gain of a significant amount of signal for a large percentage of time could justify addition of other antennas. For instance, if one considers a gain of 6 dB of the lower antenna over the higher a significant amount, then table 2 tells us that in 99.6% of the measured period the higher antenna exceeded the lower antenna by 6 dB. Or turning it around, in 0.4% of the time were the signals received by the lower antenna 6 dB higher than those by the upper antenna. Both absolute and average fading values are higher for the lower antenna. In only 1.9% of all cases did the average fading of the higher antenna exceed 6 dB, compared to 24% for the lower antenna. Similar values are found for the absolute fading.

Figures 14-17 show the results of the July 1971 measurement period for S-band. Figure 14 represents, again, the signal ratio

*Tables 2 through 7 - pages 58 to 63.

of high versus low antenna. Higher signals are received consistently by the higher antenna. Path loss, average and absolute fading are shown in figures 16 and 17. A large percentage of the time, fading was below the one dB threshold value used in the data reduction. During those time periods the values of path loss are quite steady indicating little change in atmospheric conditions. The absence of strong atmospheric changes makes a periodic structure visible which is clearly diurnal in character. It correlates with the diurnal changes in moisture measured on San Clemente Island. Table 3 summarizes the S-band data in the same format described before. No reversal of received signal strength for high and low antenna occurred during the measurement period. Fading for the lower antenna was stronger than for the high antenna.

The X-band data are shown in figures 18-21. The high-low antenna difference (signal ratio) in dB of figure 18 indicates consistently higher signals for the higher antenna. Path loss and fading are shown in figures 19-21. The X-band data are summarized in table 4. The first block shows again the percentage of time the signal ratio of high and low antenna exceed a certain value in dB. Fading at the lower is again stronger than on the higher antenna.

During the July measurement period, separate meteorological measurements were performed in the marine boundary layer from an off-shore oceanographic platform described in reference 1. Even though the meteorological measurements were not in the immediate vicinity of the radio propagation path, they proved to be quite useful in checking the internal consistency of the data. Figure 22 shows an M-profile measured on July 19, 1971 indicating a duct height of some 6 m (similar duct heights were measured throughout the radio measurement period). In figure 23 calculated values of signal ratios as a function of duct height are shown for the geometry and configuration for the San Clemente - Santa Catalina propagation link. For a duct height of 6 m we would expect signal ratios of 14, 16, and 8 dB for L-, S-, and X-band frequencies. Comparing these values with figures 10, 14, and 18 one finds an excellent agreement between calculated and measured effects of the oceanic evaporation duct on microwave radio propagation.

C. San Clemente - Santa Catalina Measurements November 1971

For the November measurement period some modifications were incorporated for measurements and data presentations. The most important modification was the addition of a third antenna between the high and the low antenna. This was done to satisfy conjectures there might be a magic antenna height around 30 feet for which signals were stronger than either for the high or for the low antenna. The addition of the third antenna changes the data presentation. The signal ratios are formed now for high-low, mid-low, and high-mid antenna positions. The presentation of average fading was abandoned because the absolute fading appears to be the critical information for system design considerations concerned with fading margins.

Figure 24 shows the path loss for the high antenna and the signal ratio of high and low antenna measured from 4 - 17 November 1971. The high signal levels on 4 and 16 November are due to elevated layers subsiding close to the water. The influence of those elevated layers is similar in figures 25 and 26 which show path loss for mid and low antenna and the signal ratios for the other antenna configurations. The fading for the three antennas is shown in figure 27. Table 5 summarizes in tabular form the findings from the November measurement for L-band. The first block gives, again, the percentage of time the signal ratio of high to low antenna exceeds a given value. For instance, in 99.7% of the two week measurement period the signals received with the higher antenna exceeded those from the lower by 3 dB. Or, in 0.3% of the time signals on the low antenna were twice as high as on the high antenna. Blocks two and three compare the middle with the low antenna and the high with the middle antenna. The remaining three blocks in table 5 give the percentage of time each of the antennas exceeds certain absolute fading values. Fading appears to increase with decreasing antenna height.

The S-band data are plotted in figures 28-31. Figure 28 shows path loss for the high antenna and the signal ratio of high and low antenna. The peaks and dips in the curves on 4 and 16 November are, again, caused by very low elevated layers. The influence of elevated layers is often accompanied by strong fading. According to figure 31, fades of 25 dB were observed on 4 November.

Table 6 summarizes the S-band data in the format explained before. Again, fading decreases with increasing antenna height.

Figures 32-35 show the X-band data. The influence of the elevated layers results in an enhanced signal strength on 4 November and a weakened signal on 16 November 1971. Signal reversals (i.e. higher signals on the lower antennas) do occur. From table 7 one can find that in 89.1% of the time the high antenna received stronger signals. The low antenna out-performed by more than 6 dB the high antenna in 4.8% of the time and the middle antenna in 2.2% of the time. The fading does not show previously observed trend of decreasing values with increasing antenna height.

V. CONCLUSIONS

Extensive measurements at L-, S-, and X-band frequencies at 19 nautical miles over-the-horizon oceanic radio propagation paths in the Southern California off-shore area indicate a significant enhancement of the signals a large percentage of the time. This enhancement must be taken into account for accurate propagation range predictions. The influence of the evaporation duct is most pronounced at X-band and decreases with decreasing frequency. Stronger signals are observed on a low sited antenna (≈15 feet above MSL) compared to a high antenna (≈65 feet above MSL) for X-band approximately 10% of the time. About five percent of the time the lower antenna receives signals which are 6 dB stronger than those received by the higher antenna. These values are considered representative for the Southern California off-shore area and are in agreement with predictions of probability of ducting based on available meteorological data.

VI. RECOMMENDATIONS

All measurements in this report were confined to one geographical area. The same measurements should be conducted in one or two other areas of the world and the findings compared with predictions from available meteorological data. If agreement is found between measurements and predictions, then it will not be necessary to conduct measurements in each individual location of interest. The radio measurements so far have shown an increased influence of the oceanic duct with increasing frequency. Frequencies above X-band should be added to the measurement program in order to establish the influence of surface roughness, duct inhomogeneities and absorption on propagation of higher frequencies in the oceanic surface evaporation duct.

VII. REFERENCES

1. Hitney, H. V. and J. F. Theisen, "A Study of Microwave Radio Propagation in the Evaporation Duct," (U), NELC TN 1757, 30 October 1970 (C).

VIII. FIGURES

1. (a) Path loss as a function of distance for a 9.6 GHz signal and antenna heights of 15 and 120 feet.
   Path loss increases at ranges over 40 miles because of reflection from elevated layers.

   (b) Refractive index profile at time of path loss measurements. M is modified refractive index.

   (c) Ray trace for the refractive index profile of (b) and transmitter height of (a). Rays bend downward again at longer ranges explaining the increased signals (or decreased path loss) of (a).
2. Propagation Path
3. Transmitting System
4. Transmitter
5. Receiving System
6. Receiving Antennas
7. Path loss for a 19 nautical mile propagation path at L-band
8. Path loss for a 19 nautical mile propagation path at S-band
9. Path loss for a 19 nautical mile propagation path at X-band
10. Difference high-low antenna L-band July 1971
11. Path loss L-band July 1971
12. Average fading L-band July 1971
13. Absolute fading L-band July 1971
14. Difference high-low antenna S-band July 1971
15. Path loss S-band July 1971

16. Average fading S-band July 1971

17. Absolute fading S-band July 1971

18. Difference high-low antenna X-band July 1971

19. Path loss X-band July 1971

20. Average fading X-band July 1971

21. Absolute fading X-band July 1971

22. M-profile for 19 July 1971

23. Calculated signal ratios as a function of duct height

24. Difference high-low antenna and path loss L-band November 1971

25. Difference mid-low antenna and path loss L-band November 1971

26. Difference high-mid antenna and path loss L-band November 1971

27. Fading L-band November 1971

28. Difference high-low antenna and path loss S-band November 1971

29. Difference mid-low antenna and path loss S-band November 1971

30. Difference high-mid antenna and path loss S-band November 1971

31. Fading S-band November 1971

32. Difference high-low antenna and path loss X-band November 1971

33. Difference mid-low antenna and path loss X-band November 1971

34. Difference high-mid antenna and path loss X-band November 1971

35. Fading X-band November 1971

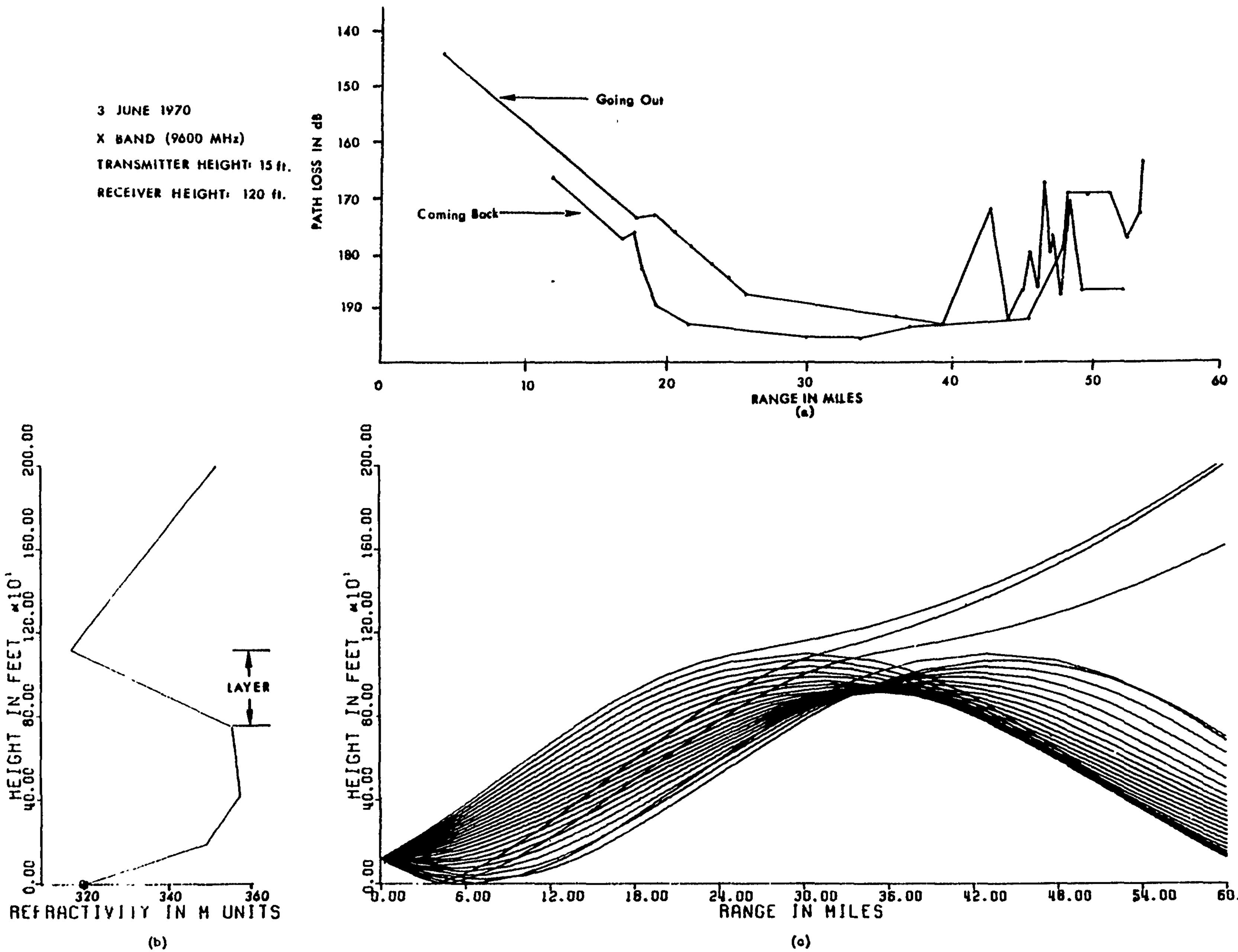

Figure 1 Influence of elevated refractive structures on a

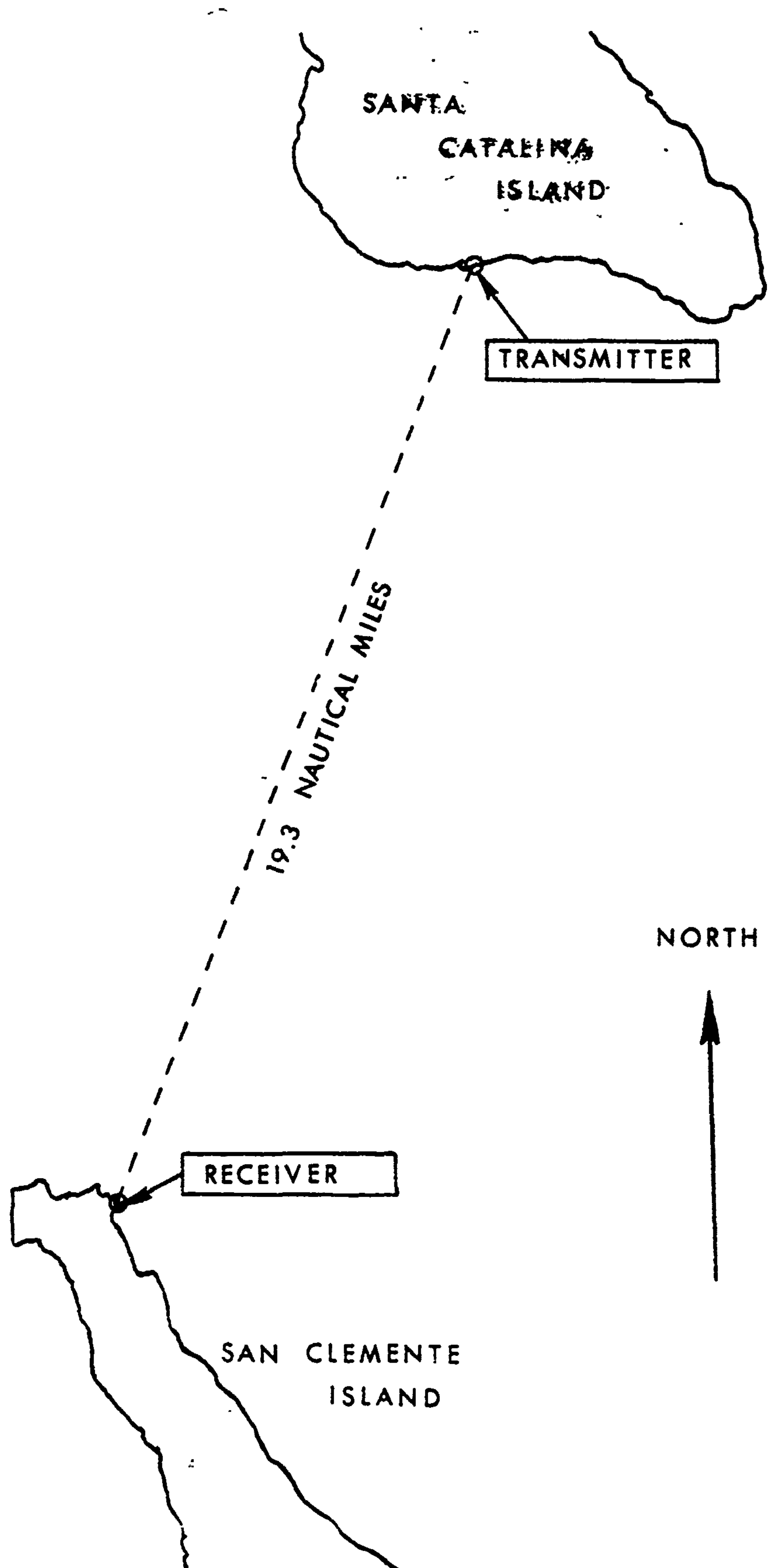

Figure 2. Propagation Path

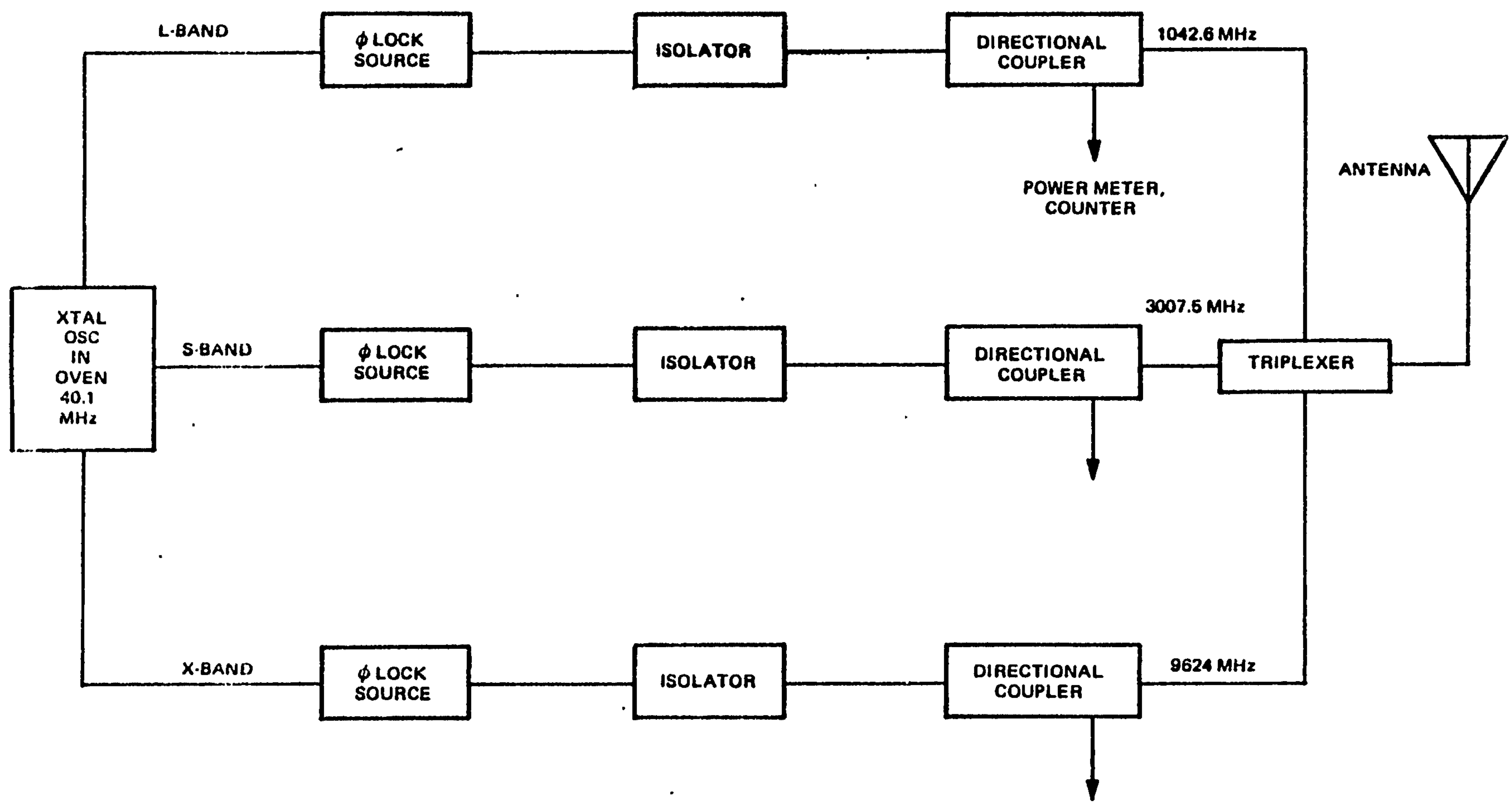

Figure 3. TRANSMITTING SYSTEM

Figure 4. Transmitter

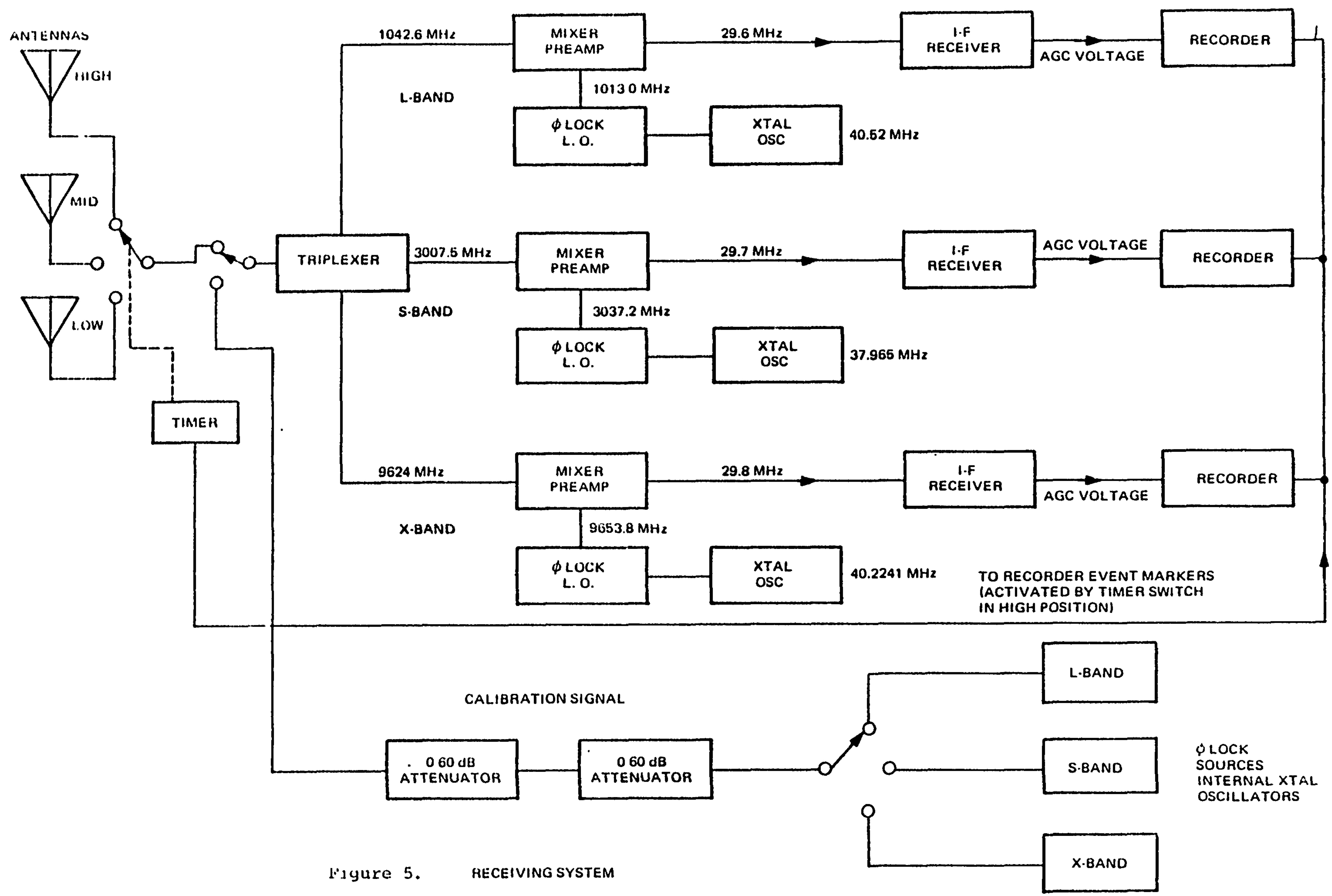

Figure 5. RECEIVING SYSTEM

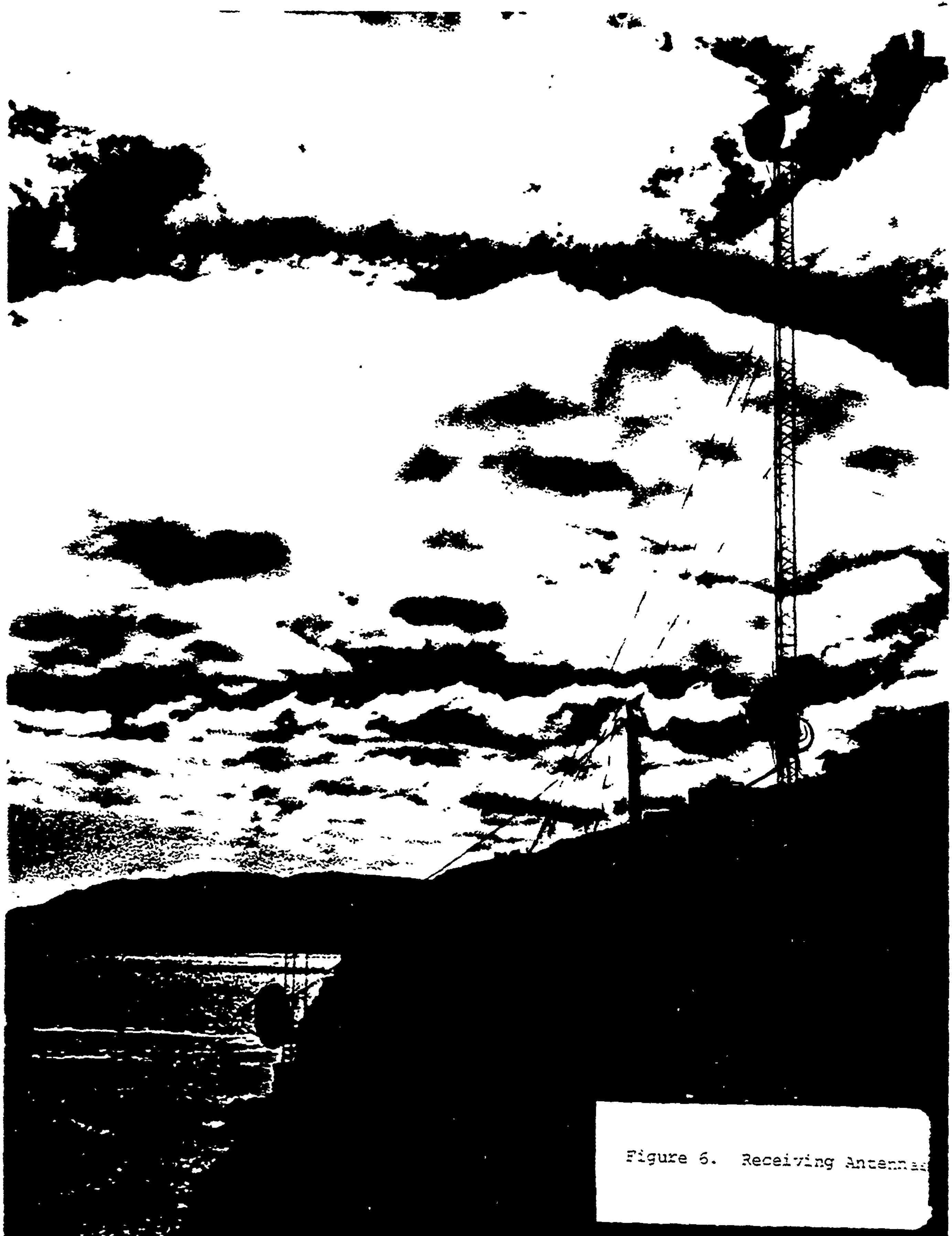

Figure 6. Receiving Antennas

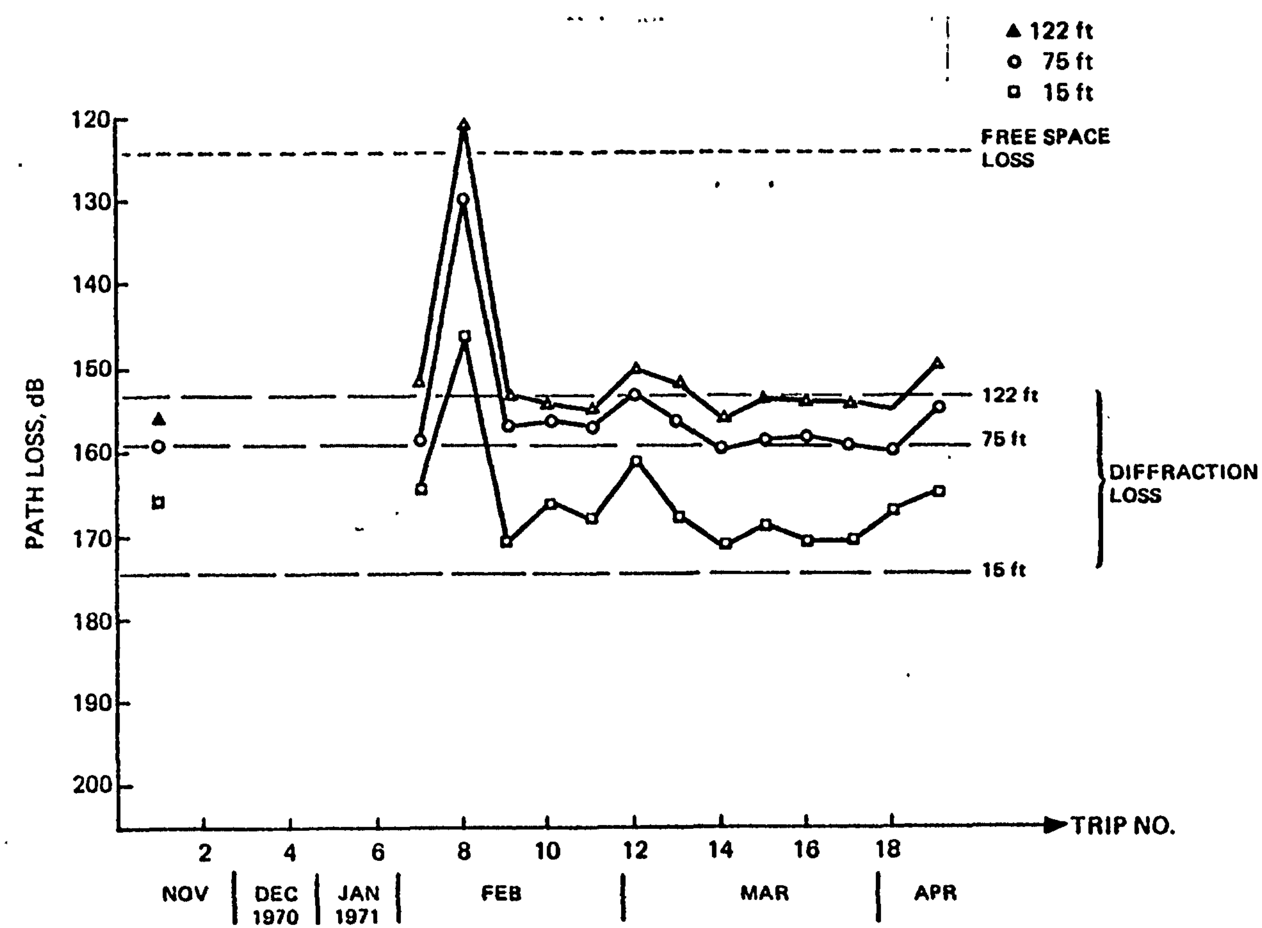

Figure 7. Path Loss at 19 nautical miles

L BAND

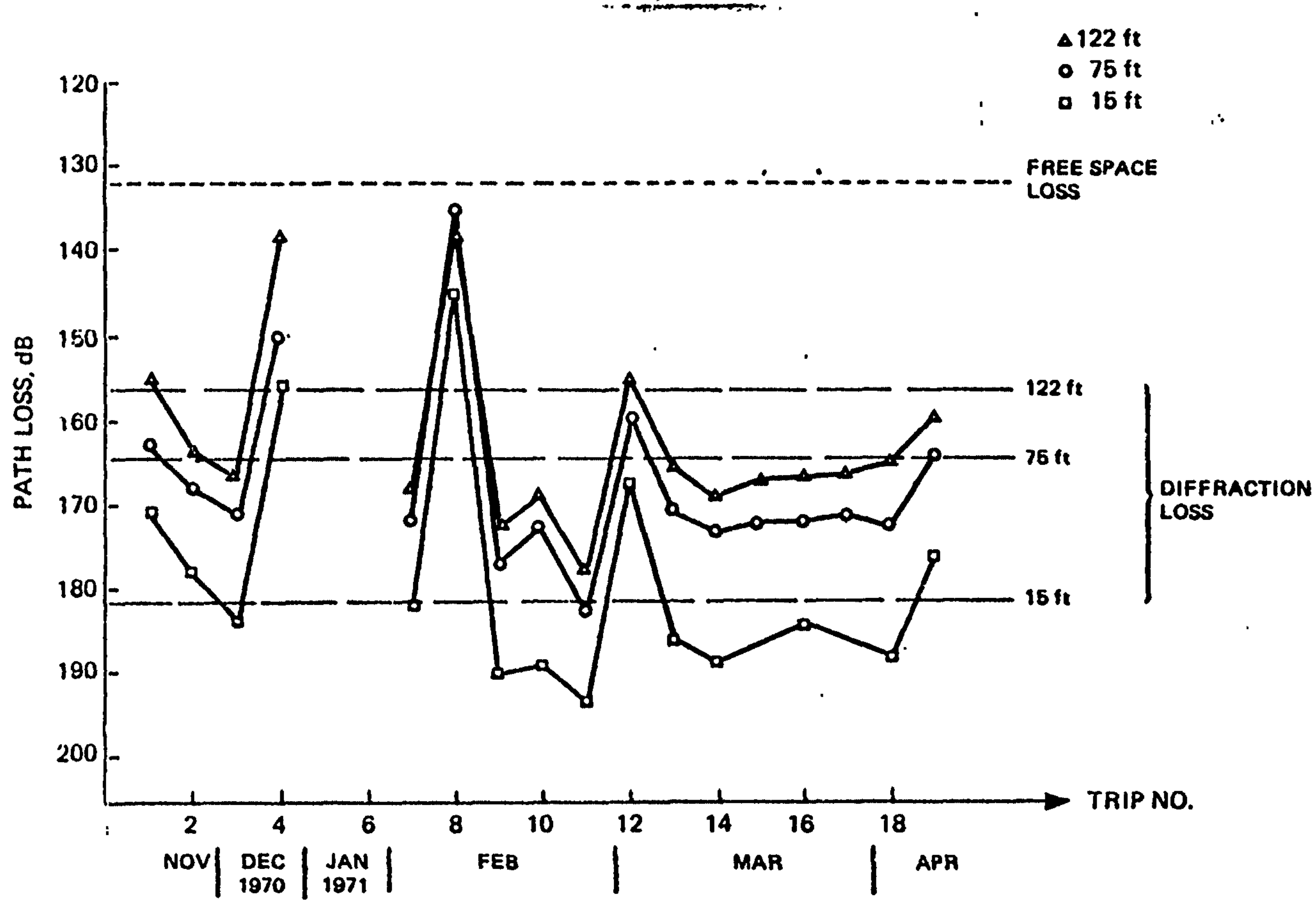

Figure 8. Path Loss at 19 nautical miles

S BAND

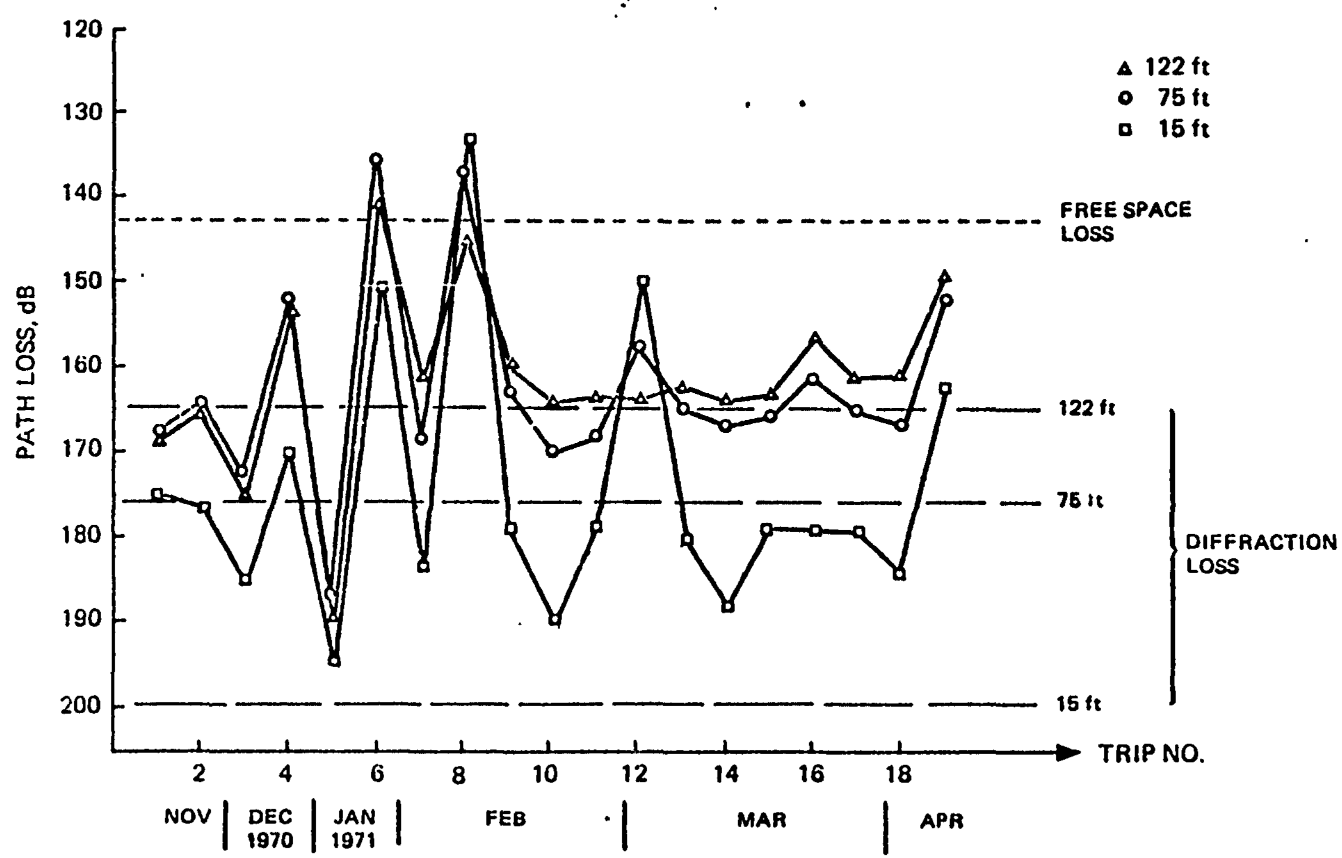

Figure 9. Path Loss at 19 nautical miles

X BAND

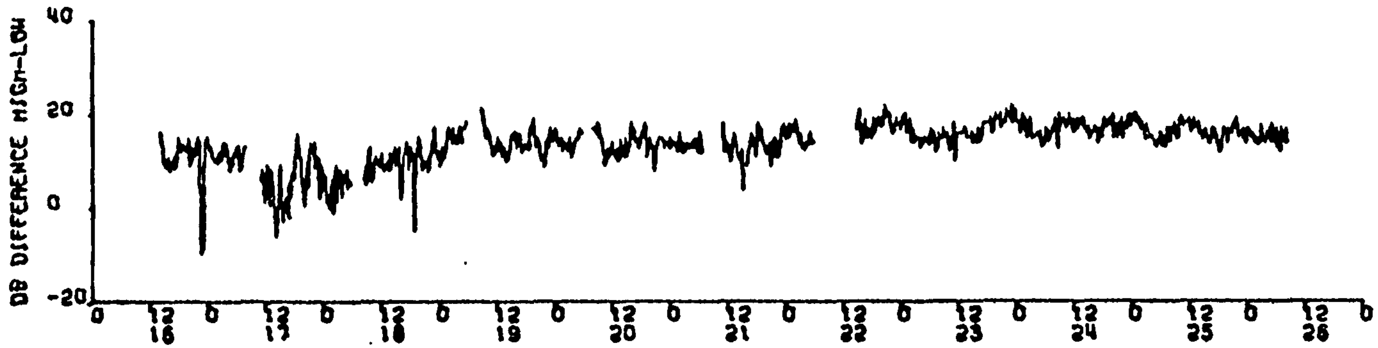

Figure 10. L BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

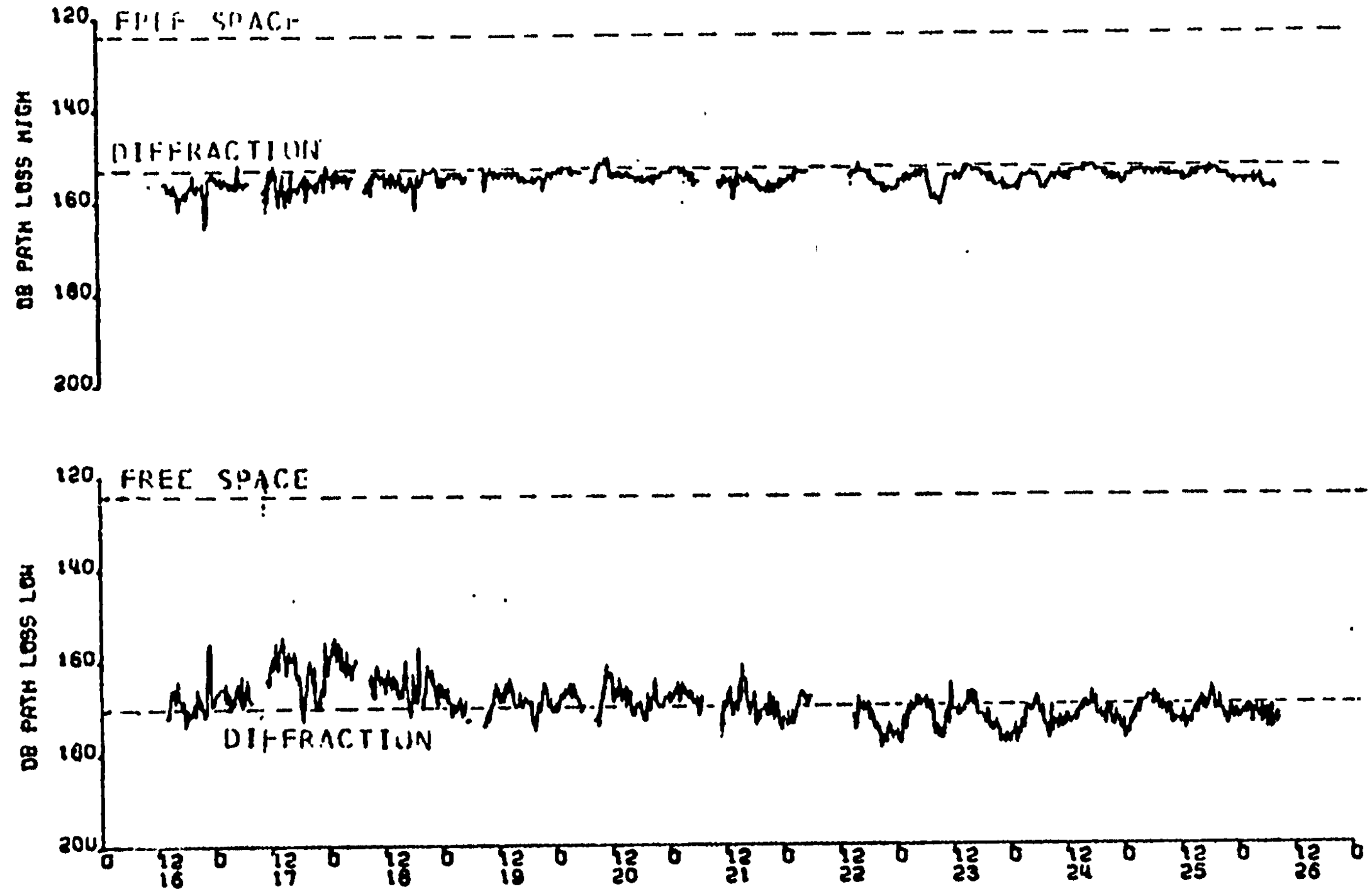

Figure 11. L BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

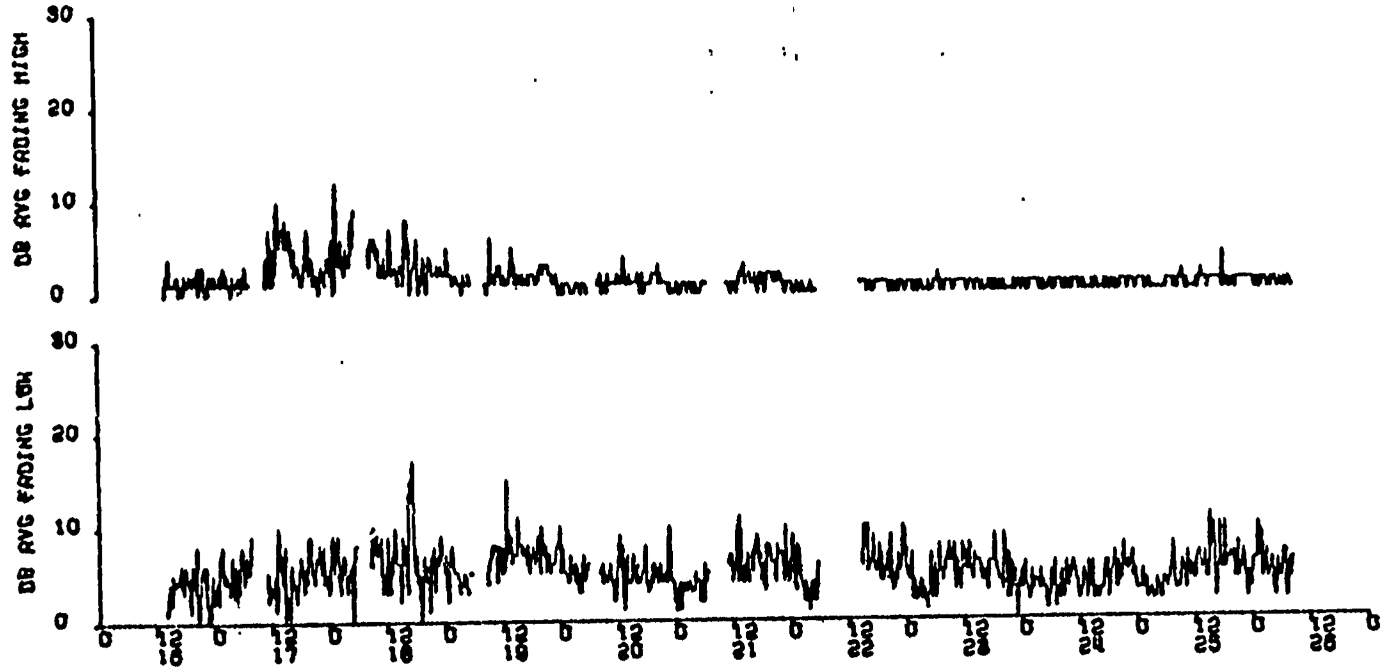

Figure 12. L BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

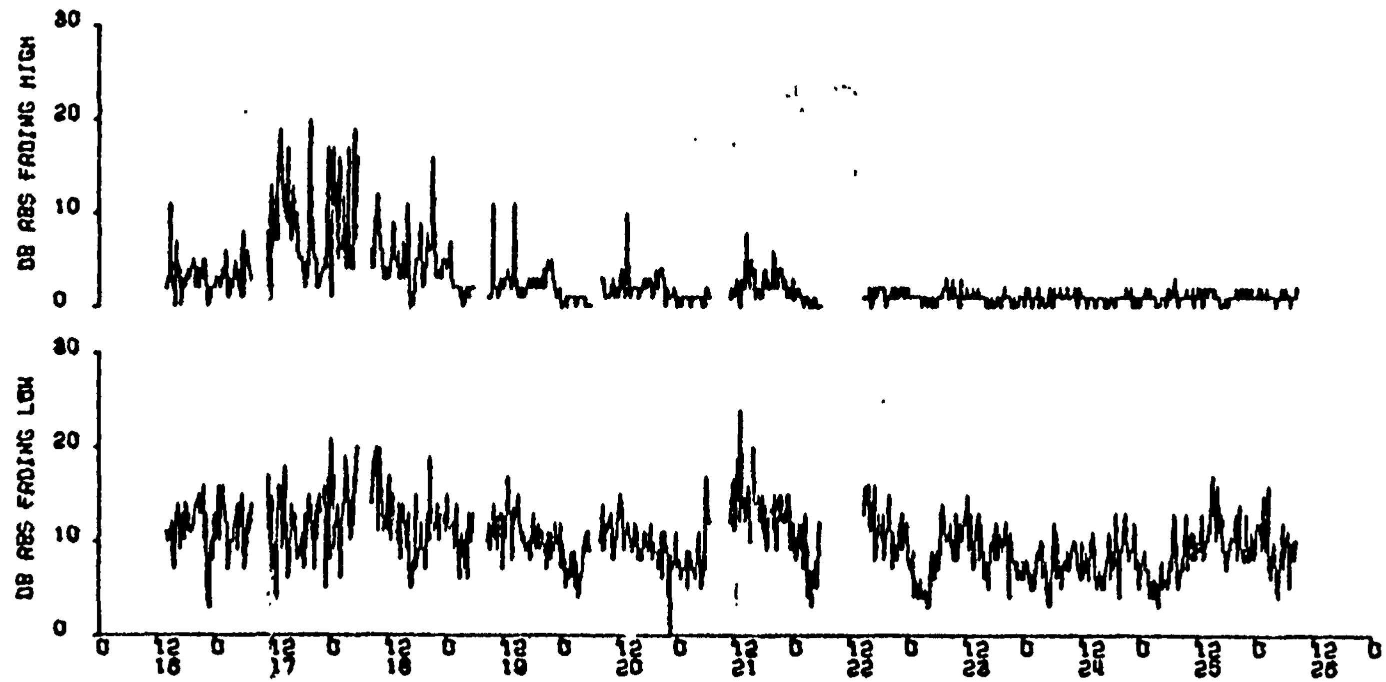

Figure 13. L BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

Figure 14. S BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

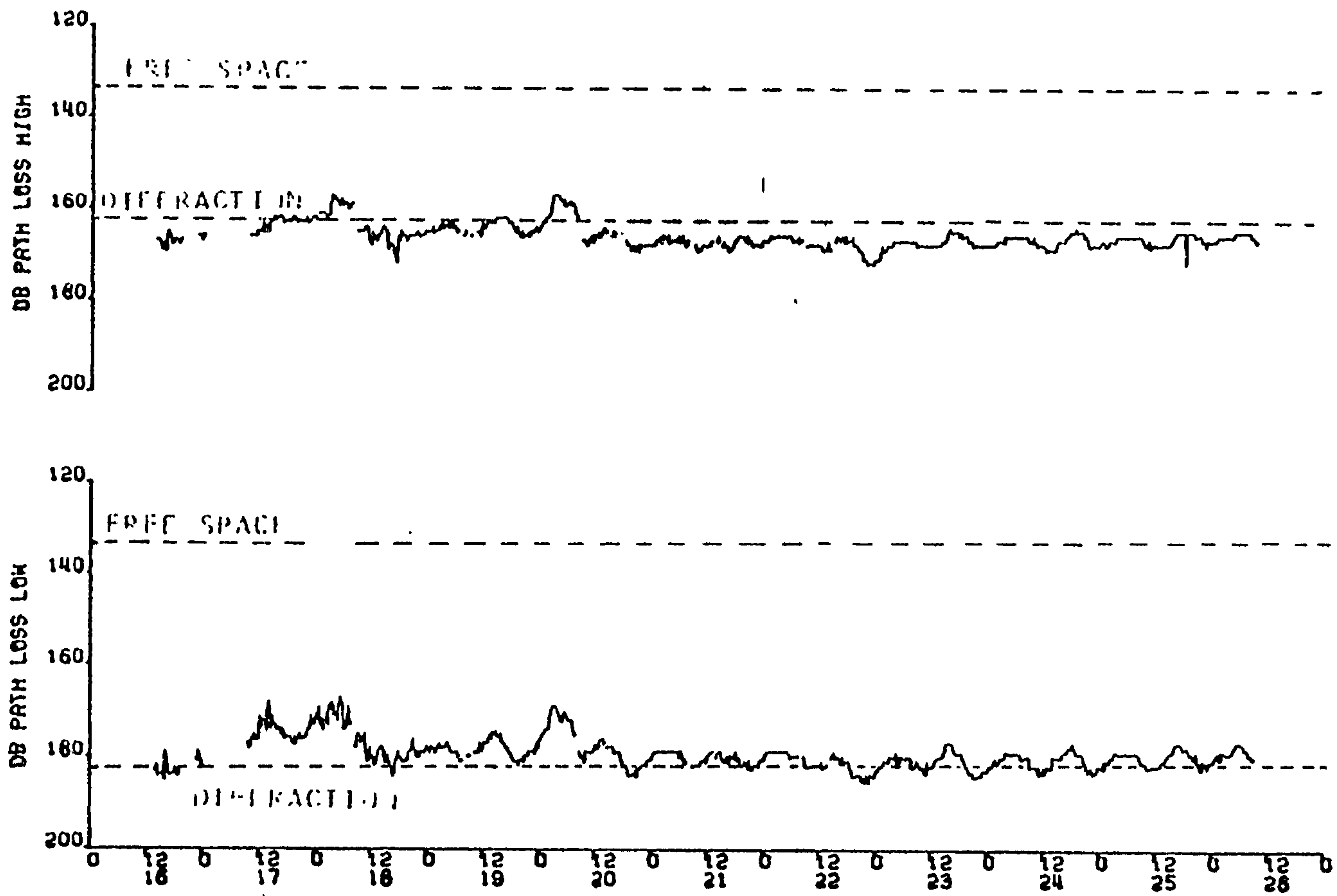

Figure 15. S BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

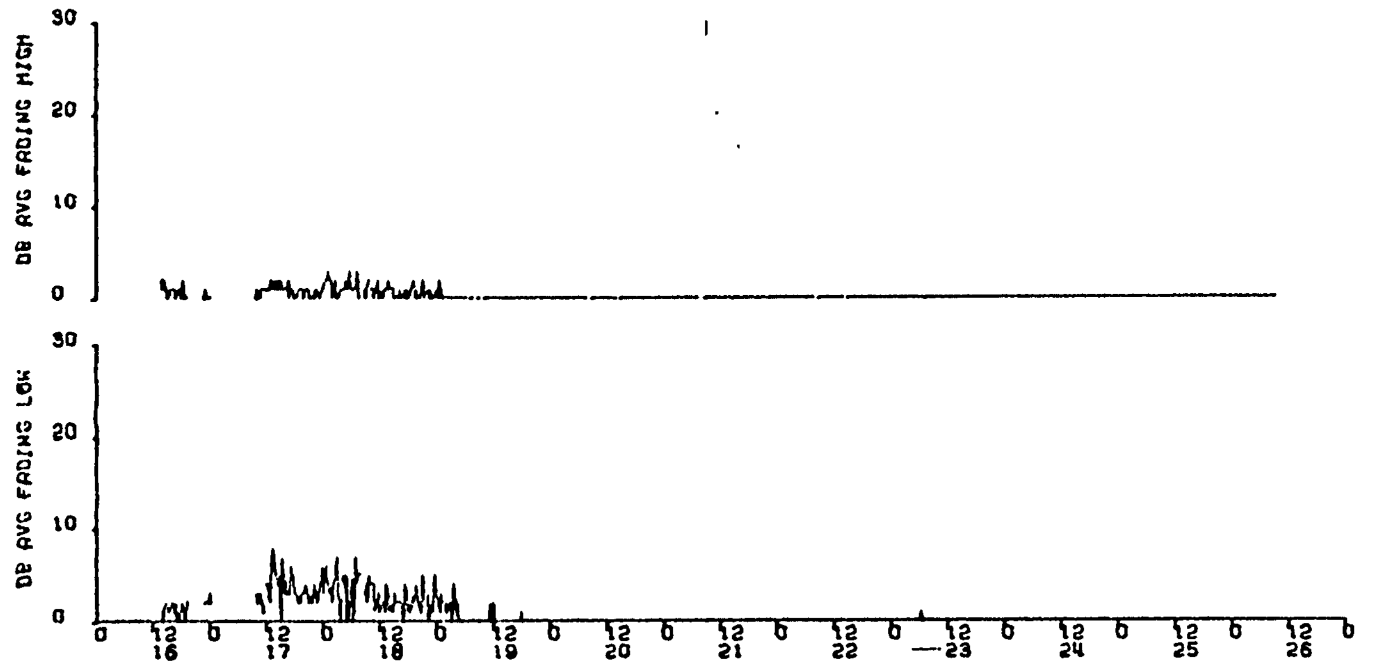

Figure 16. S BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

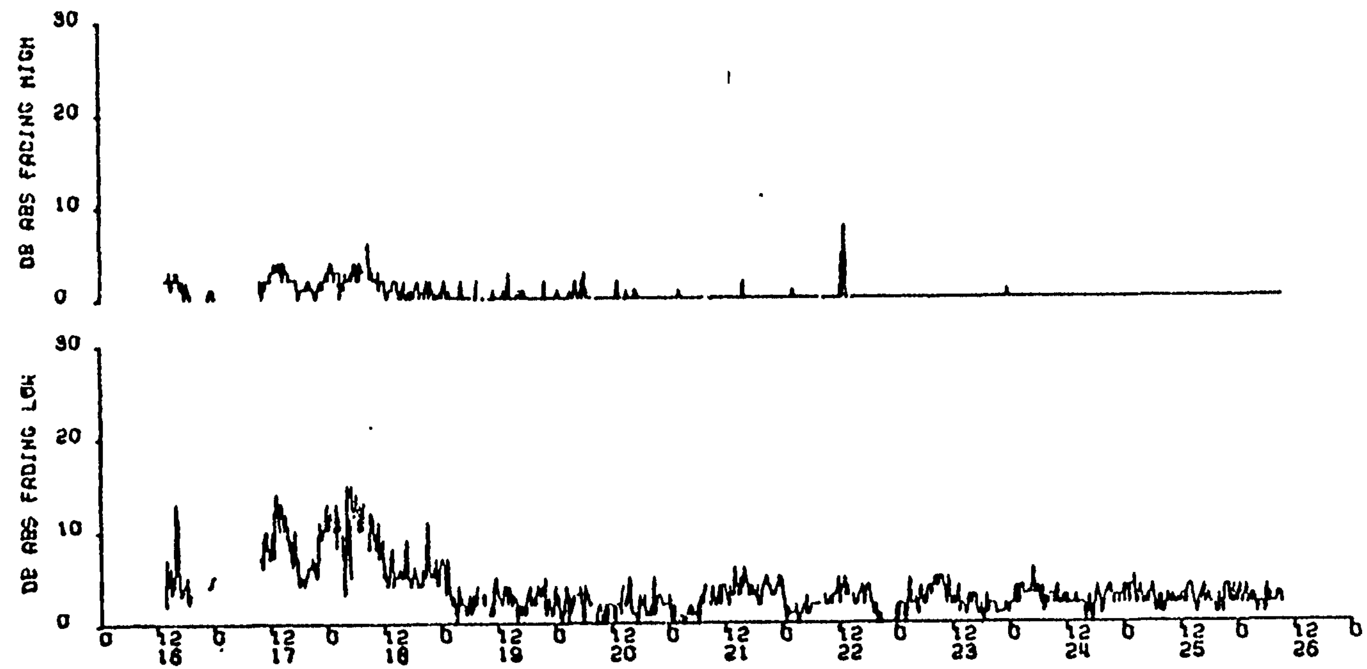

Figure 17. S BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

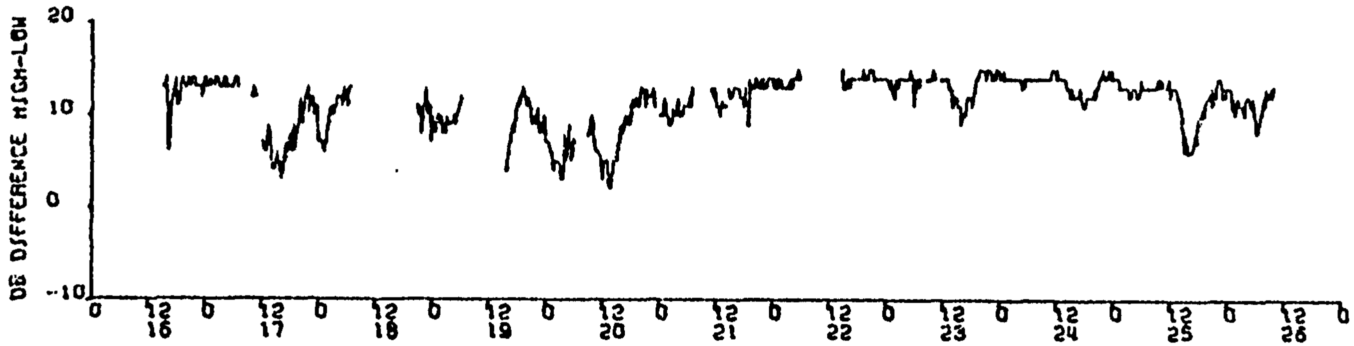

Figure 18. X BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

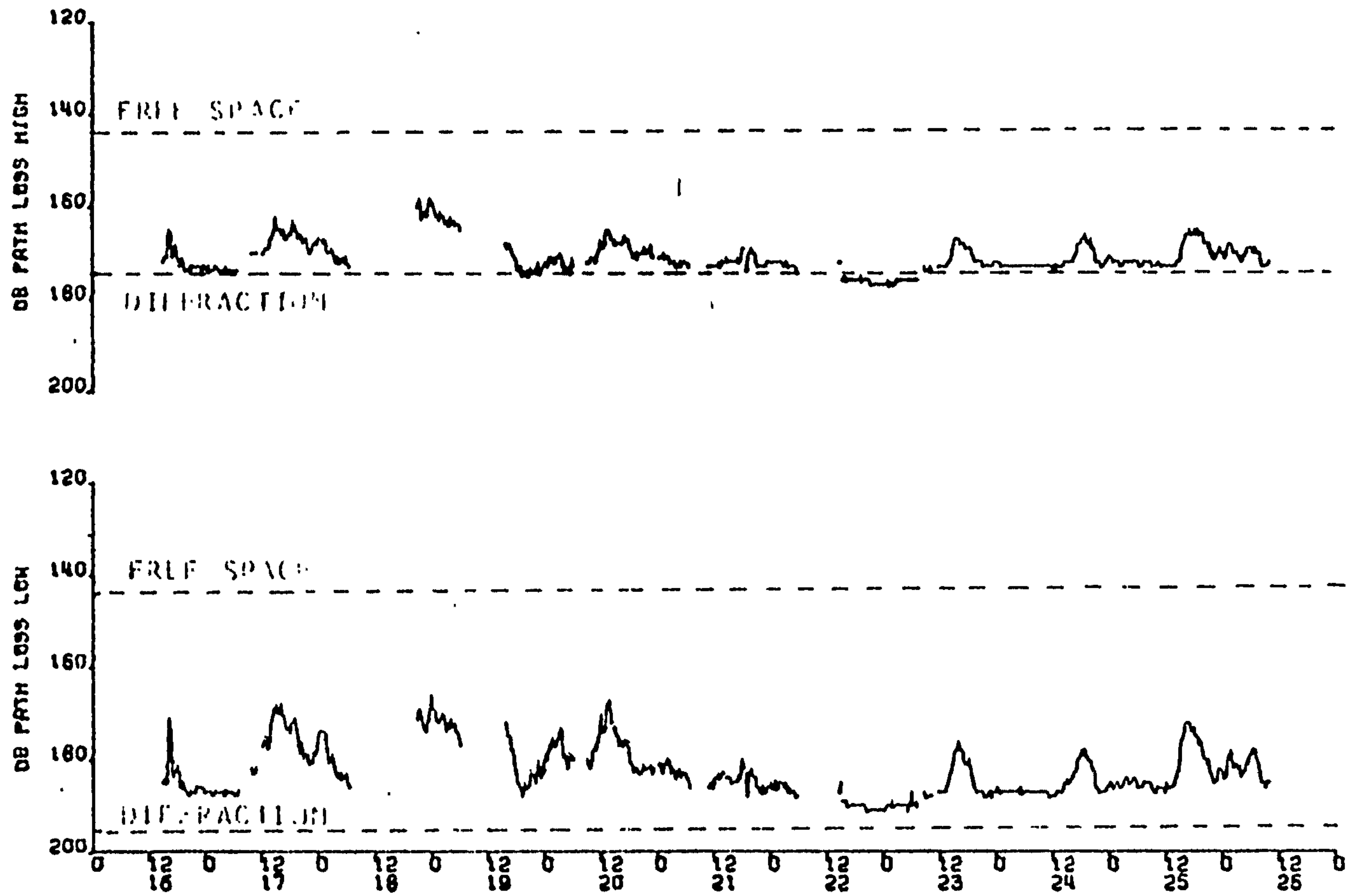

Figure 19. X BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

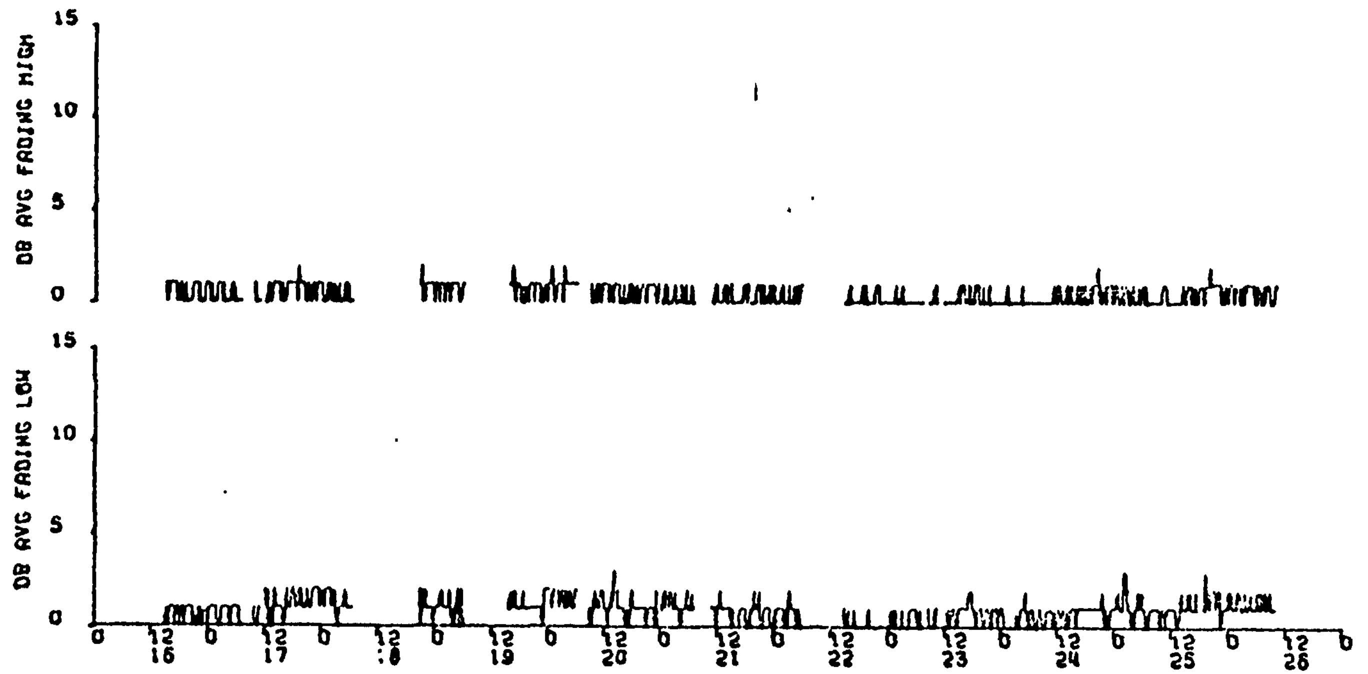

Figure 20. X BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

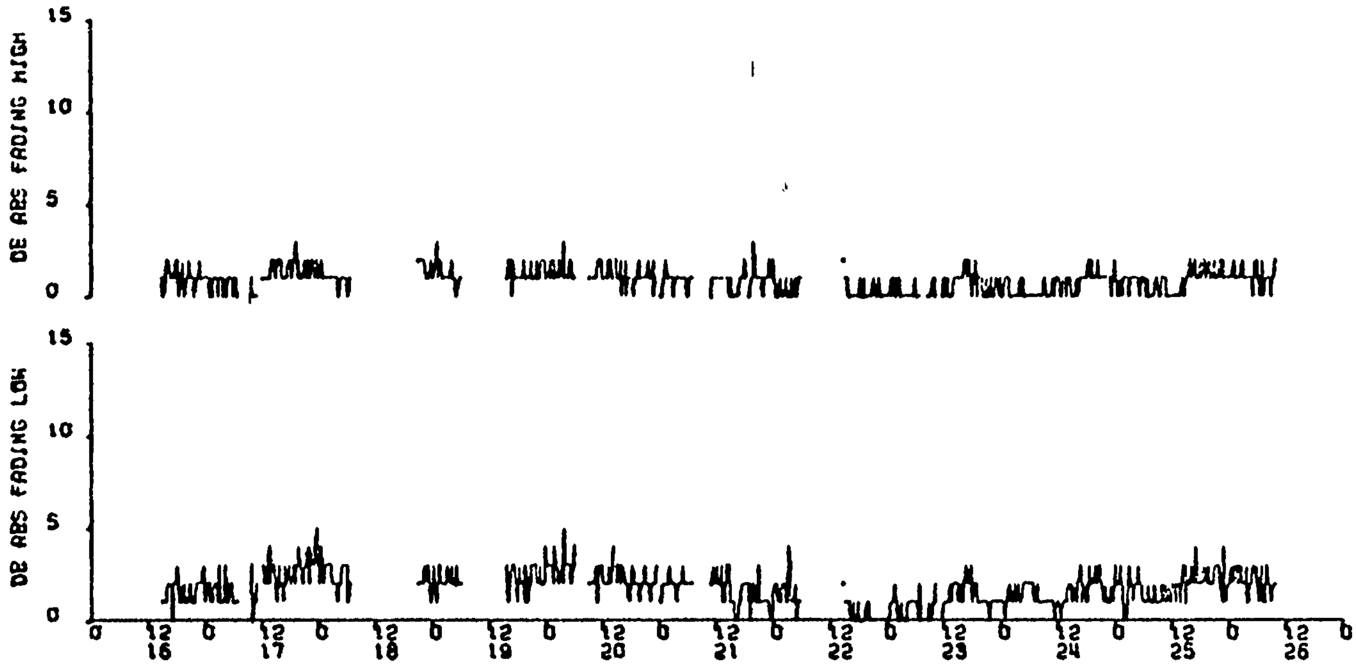

Figure 21. X BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

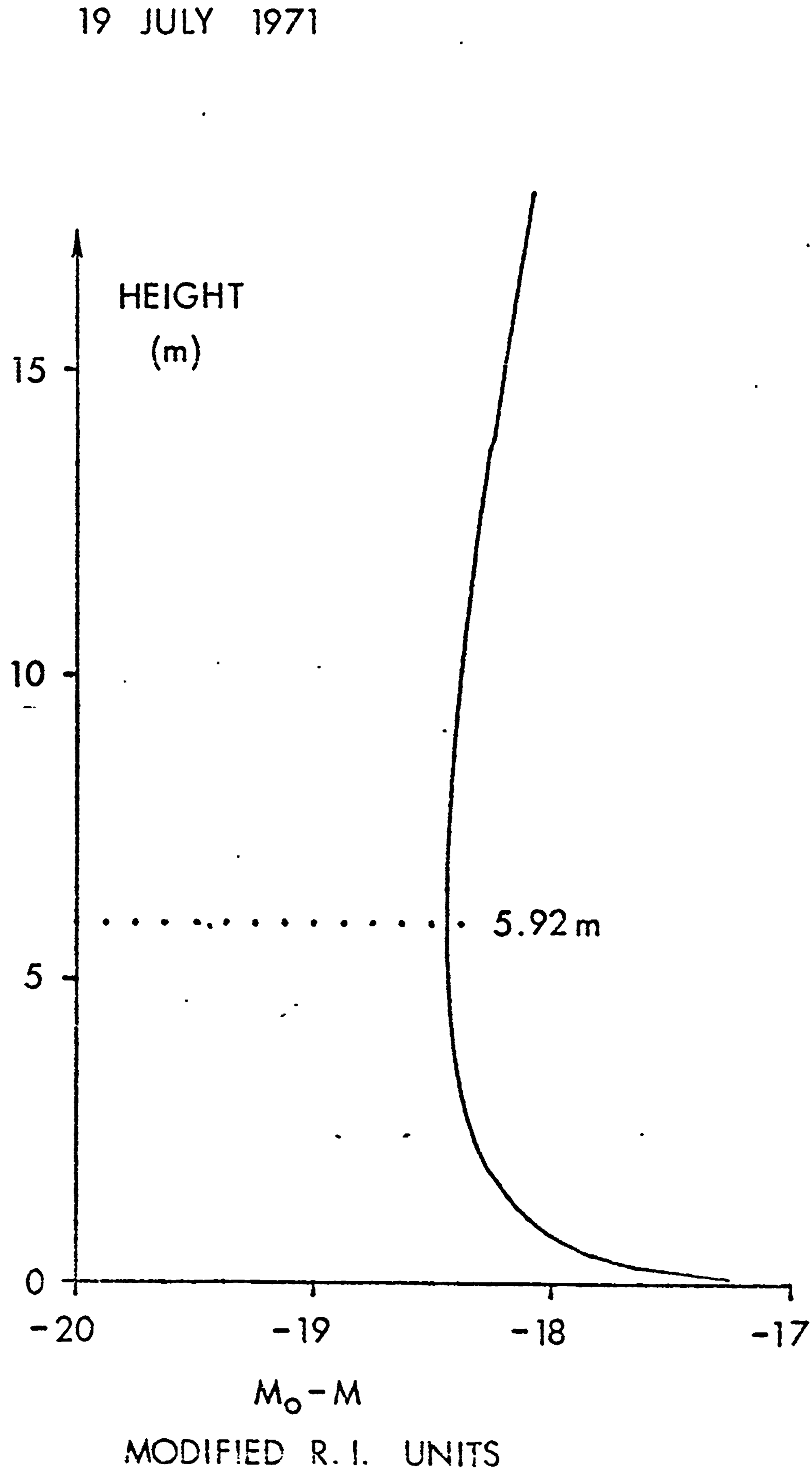
19 JULY 1971
HEIGHT
(m)
15
10
5
0
5.92 m
-20
-19
-18
-17
$M_o - M$
MODIFIED R. I. UNITS

Figure 22

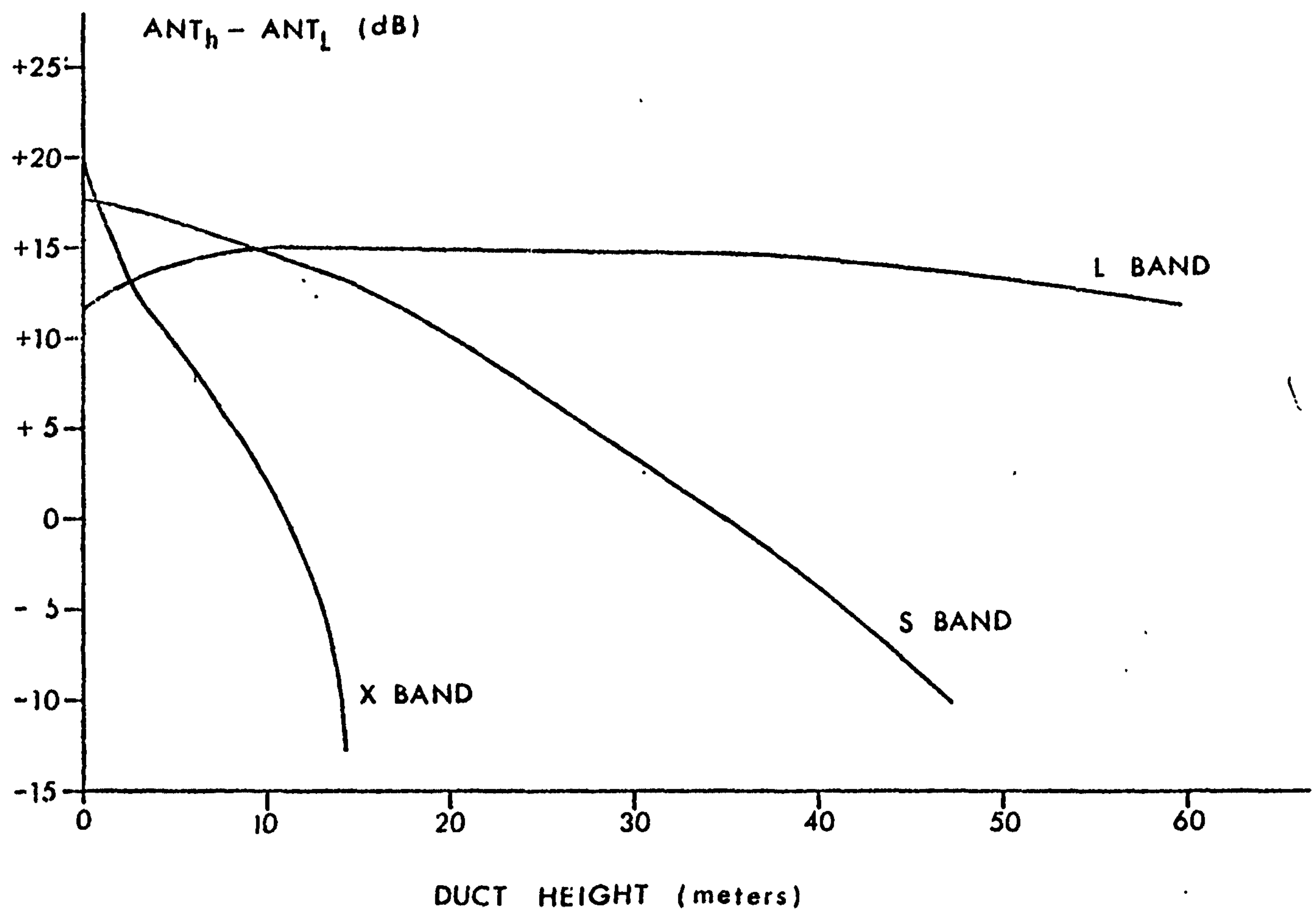

Figure 23. Calculated signal ratios versus duct height for 19.3 propagation link.

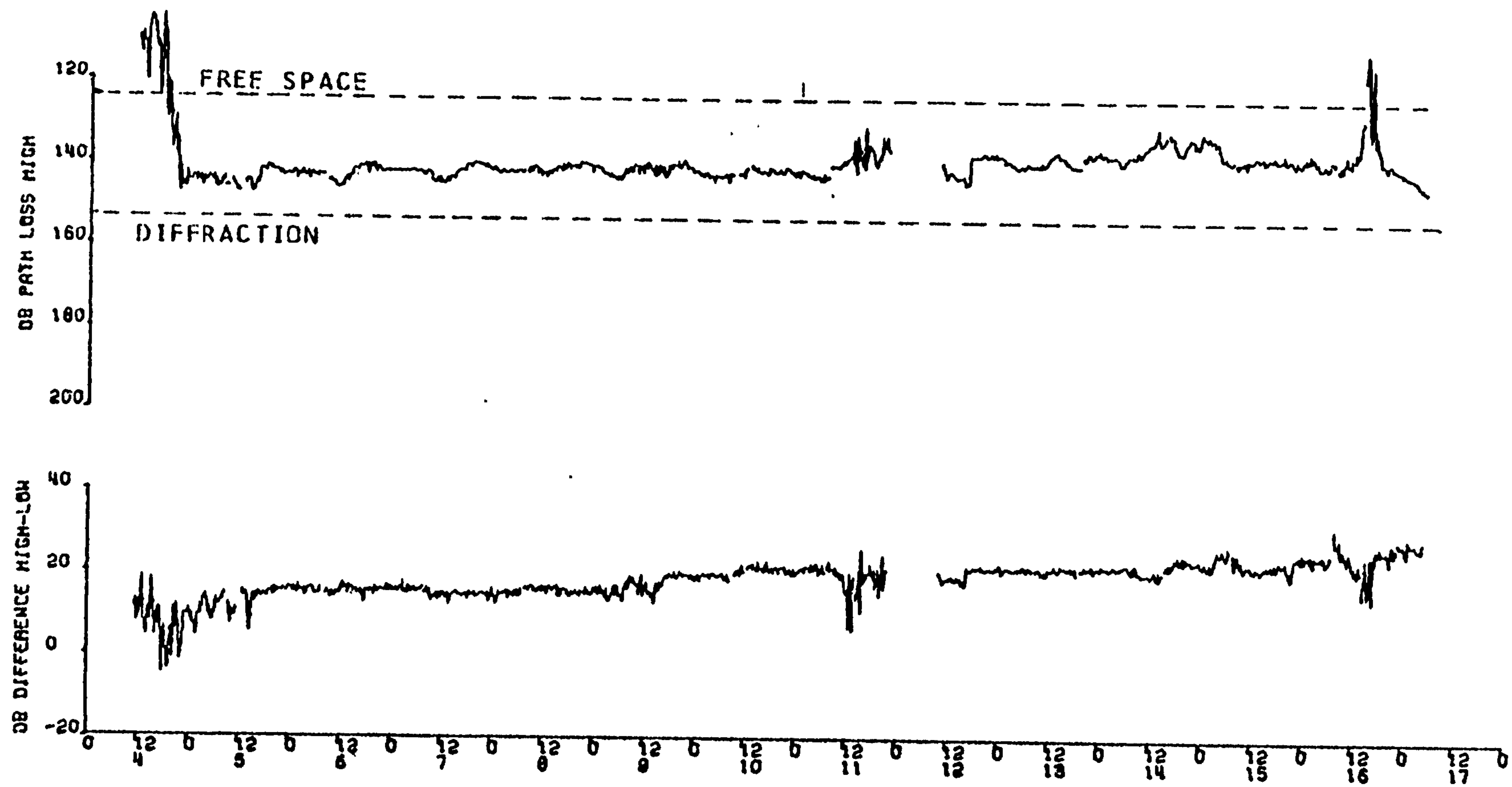

Figure 24. L BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

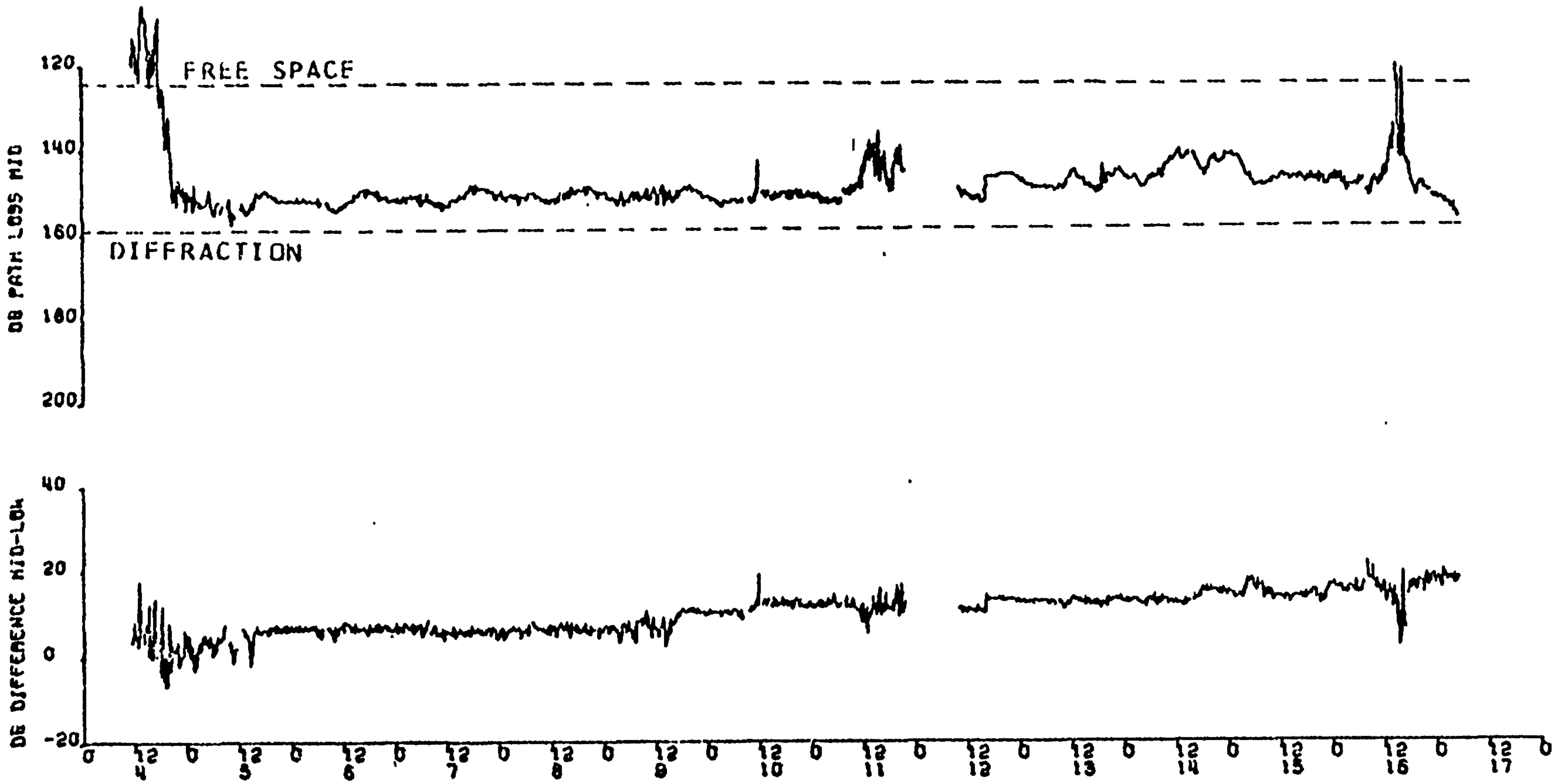

Figure 25. L BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

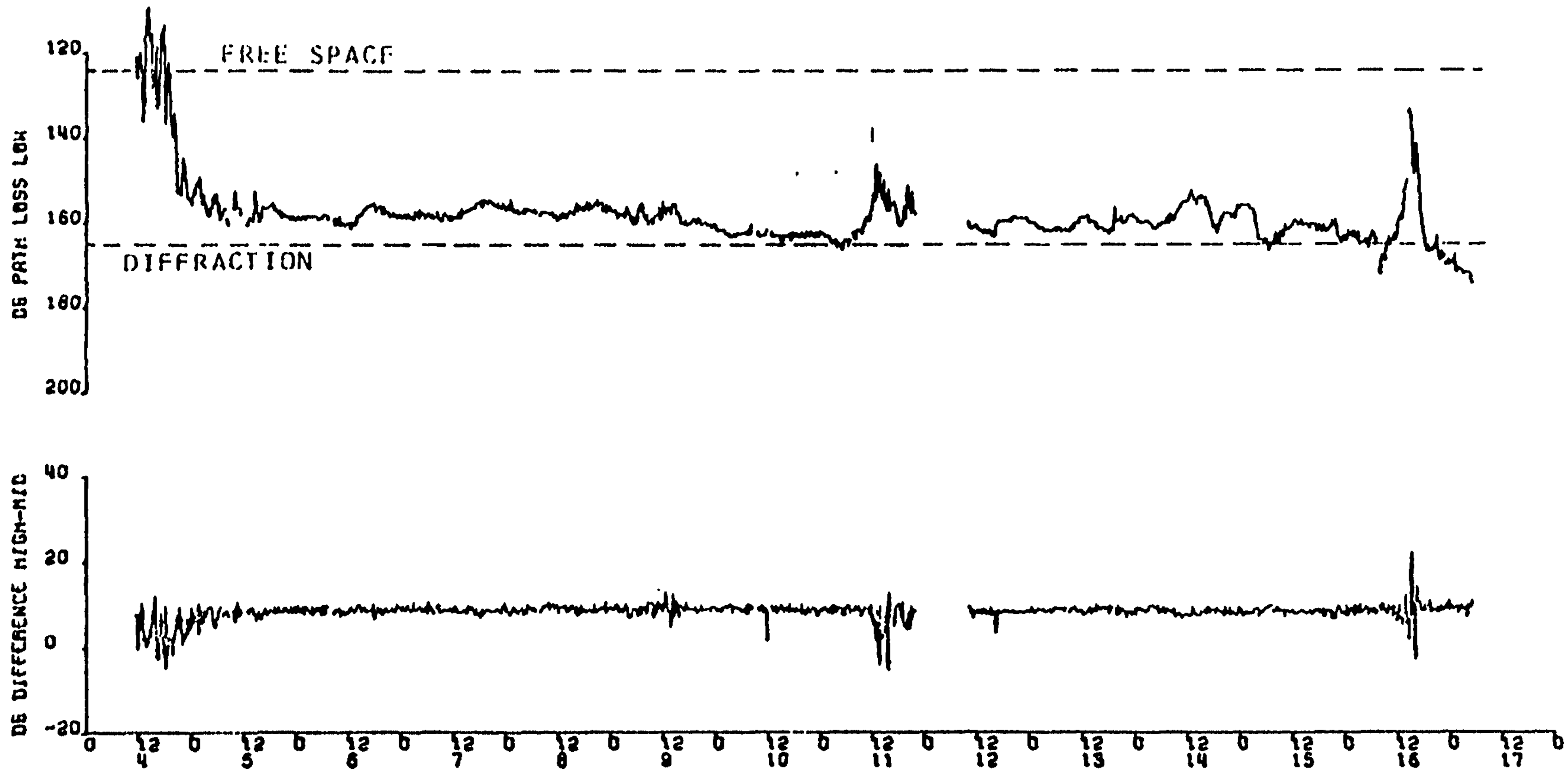

Figure 26. L BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

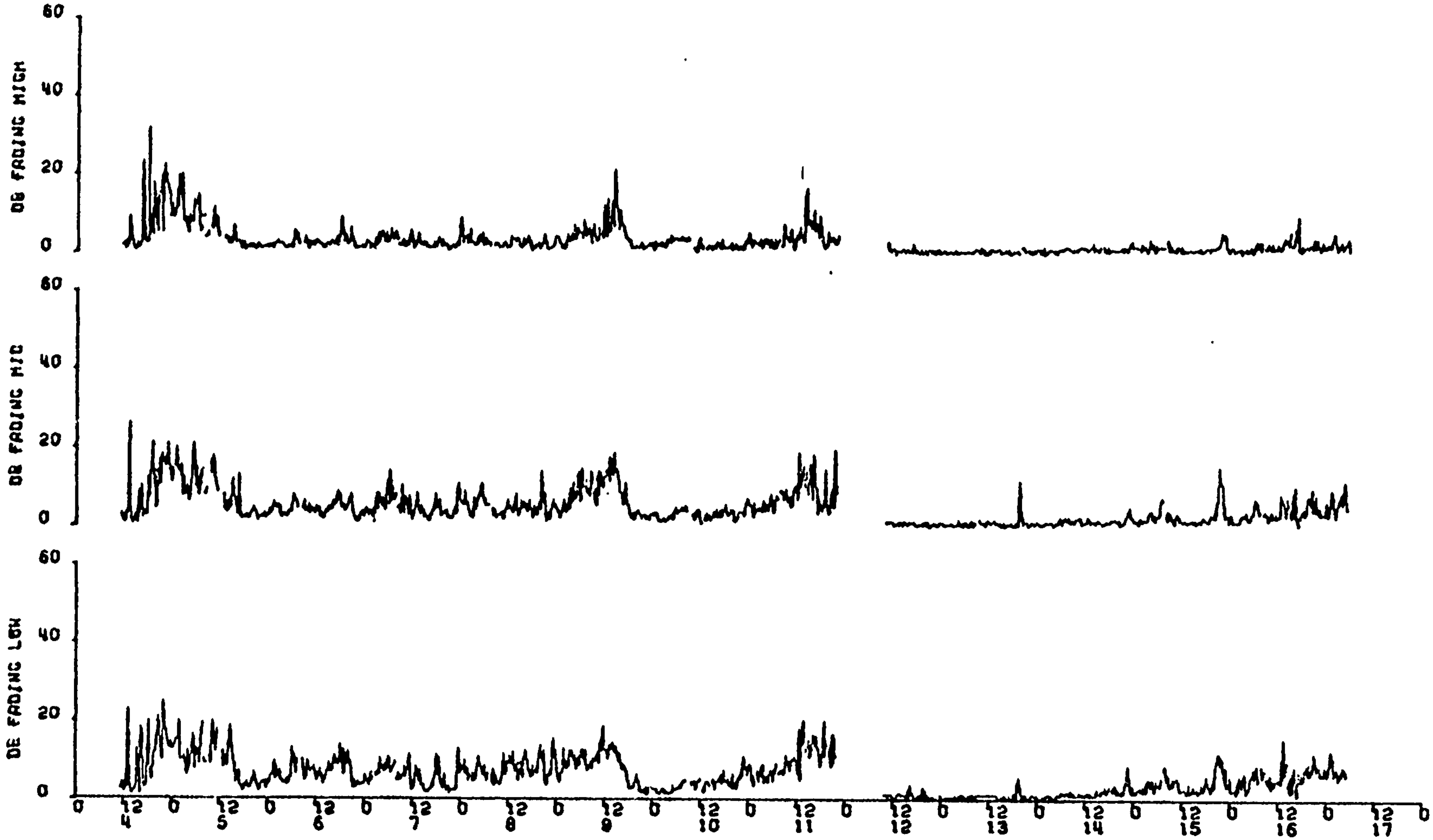

Figure 27. L BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

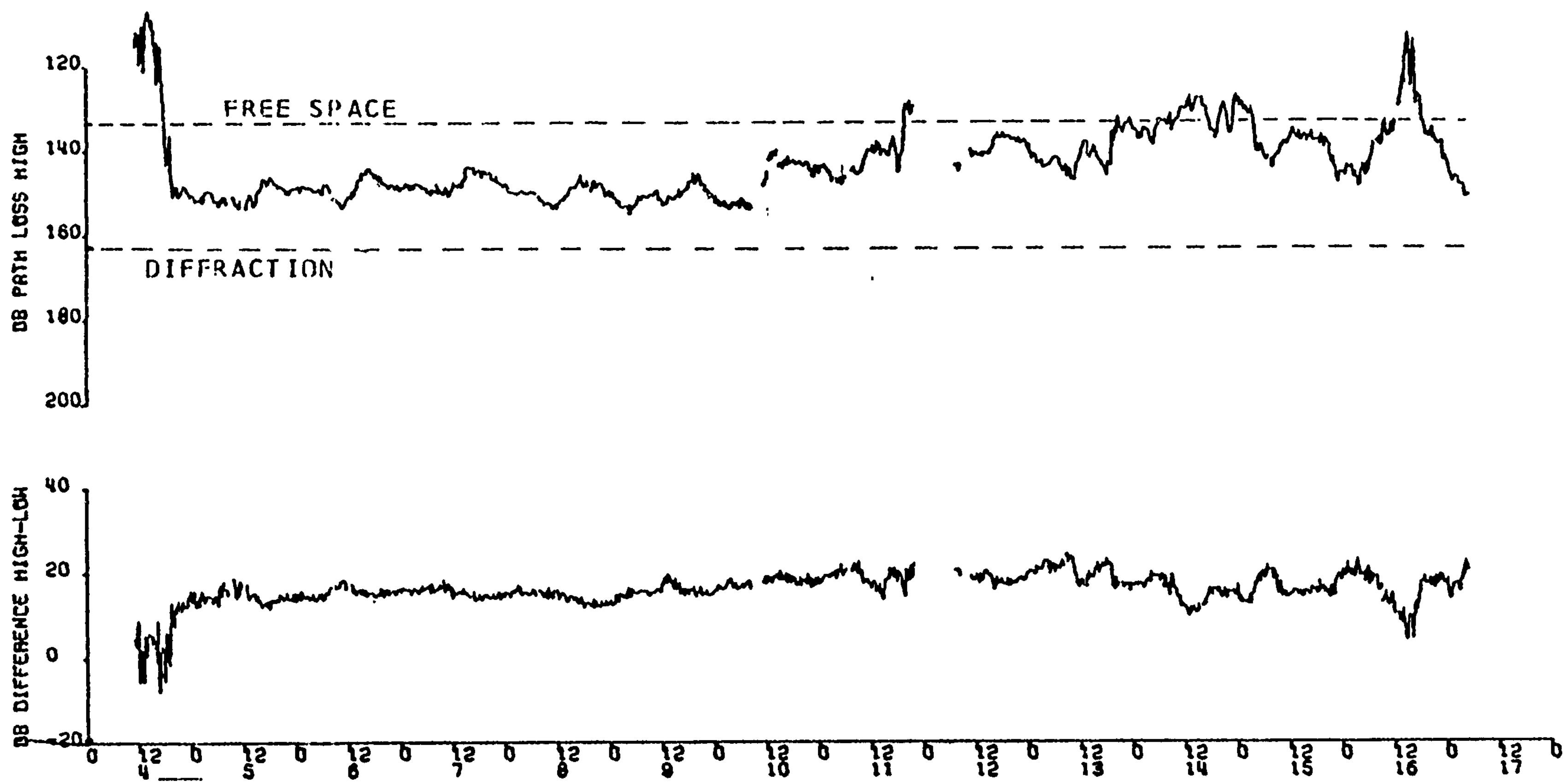

Figure 28. S BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

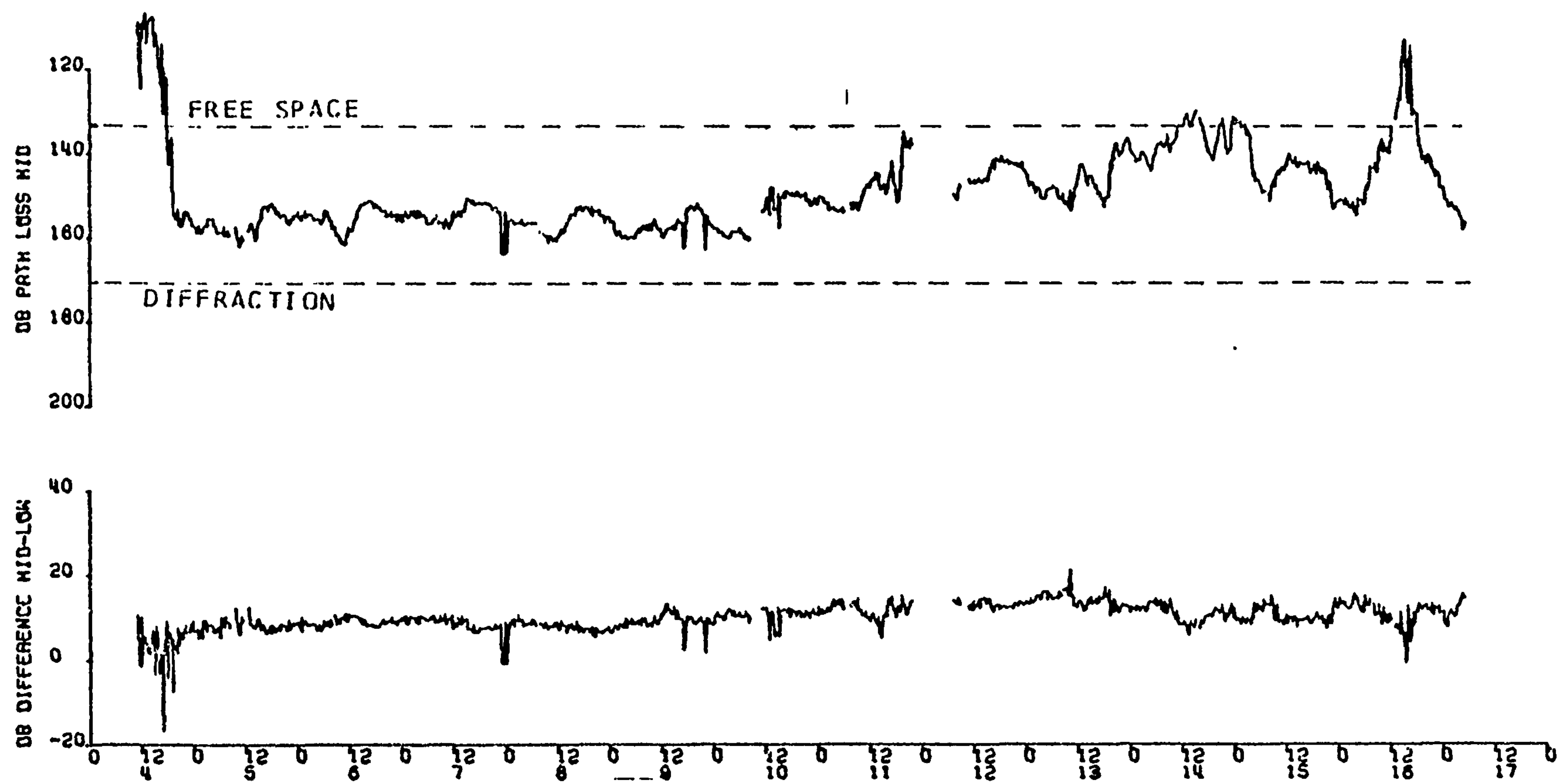

Figure 29. S BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

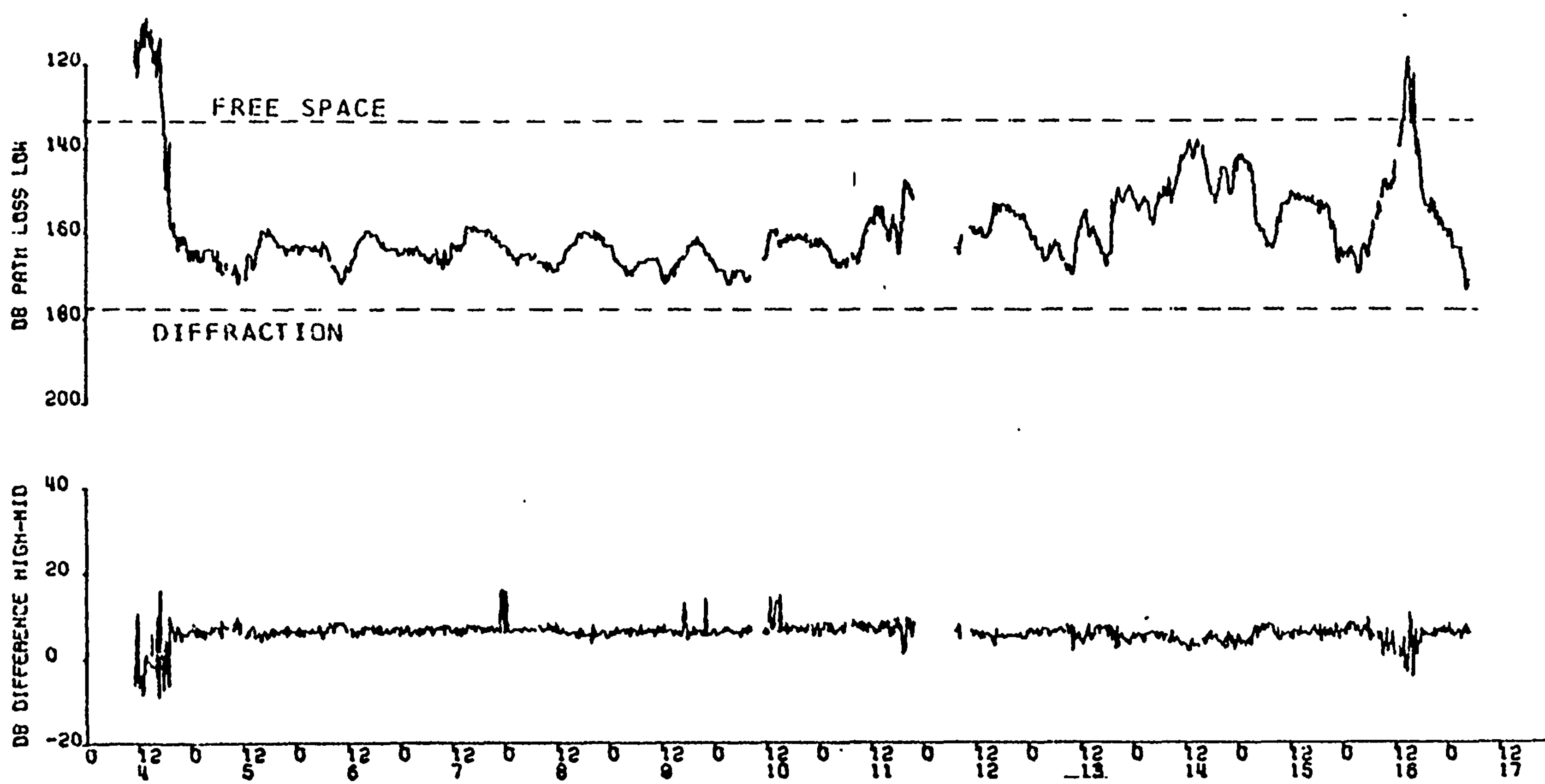

Figure 30. S BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

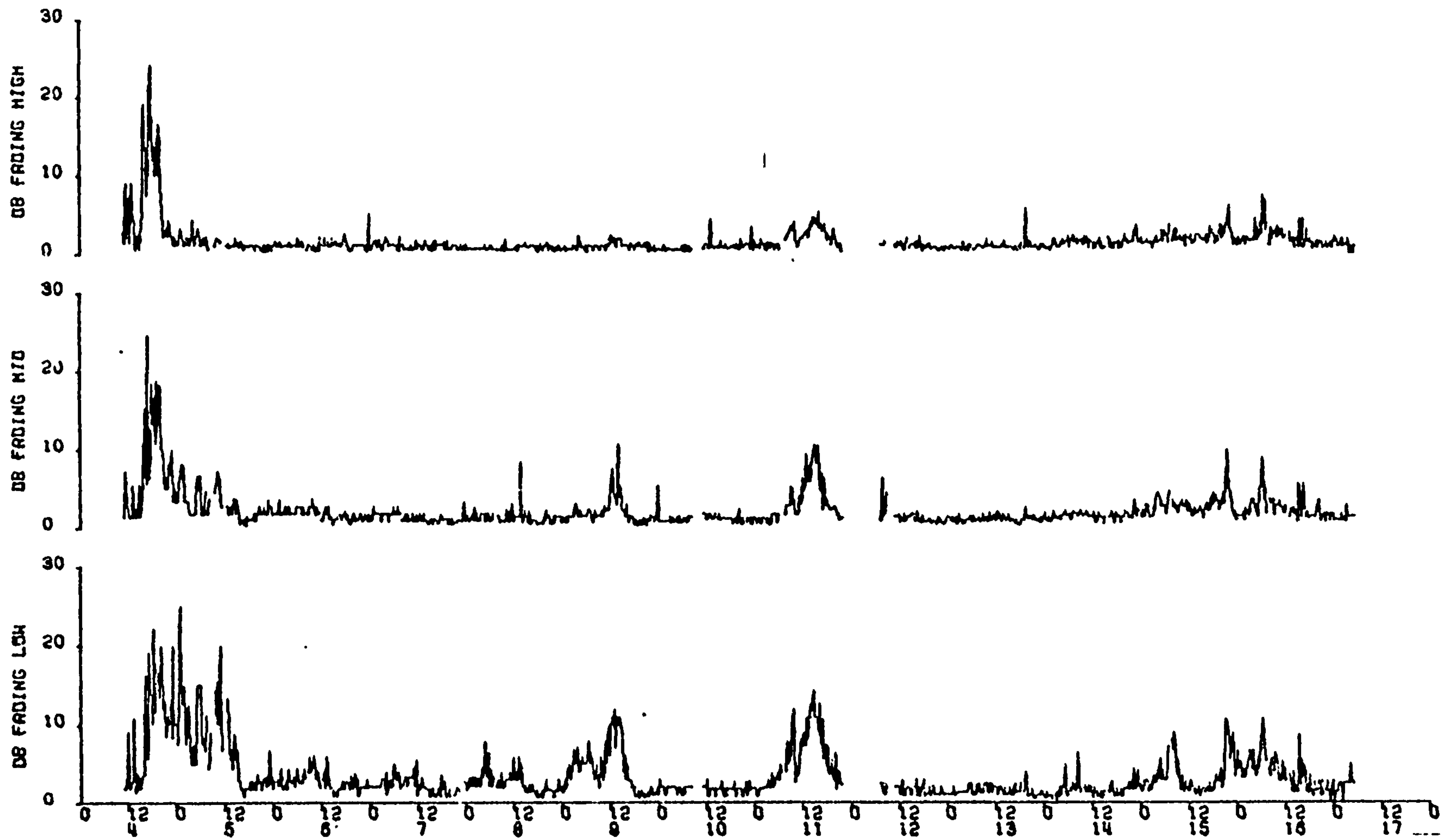

Figure 31. S BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

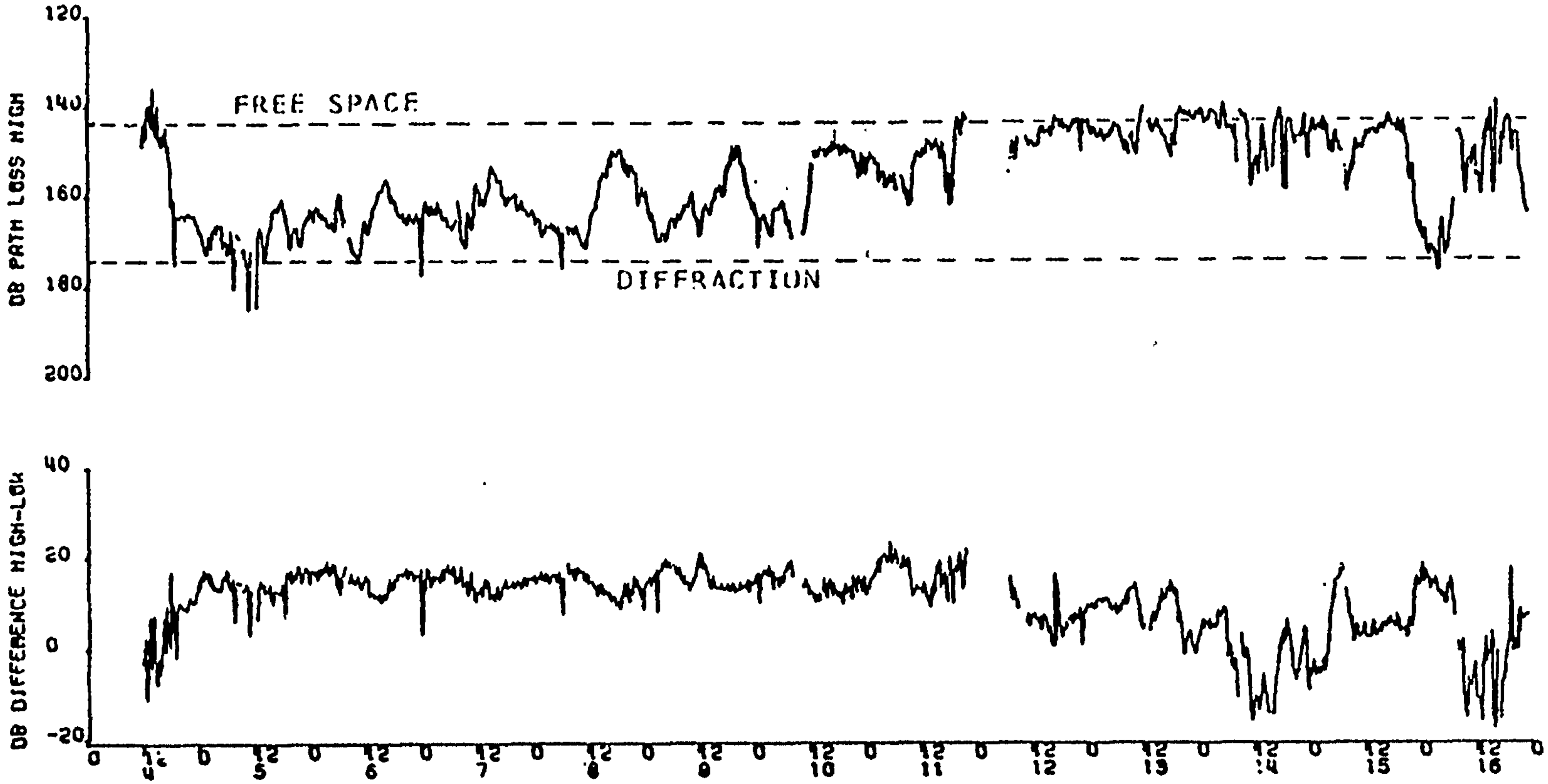

Figure 32. X BAND CATALINA TO SAN CLEMENTE ISLAND. NOVEMBER 1971.

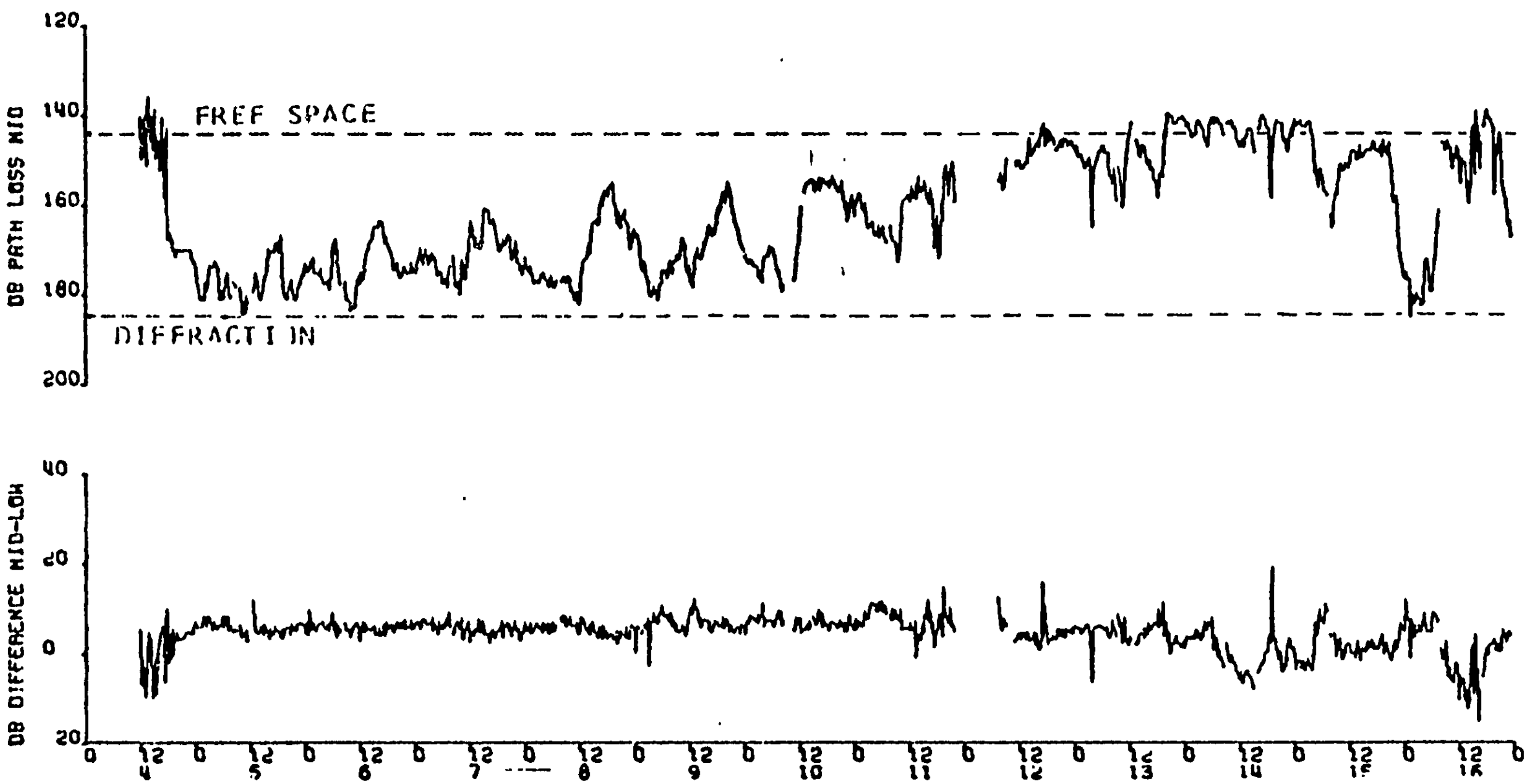

Figure 33. X BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

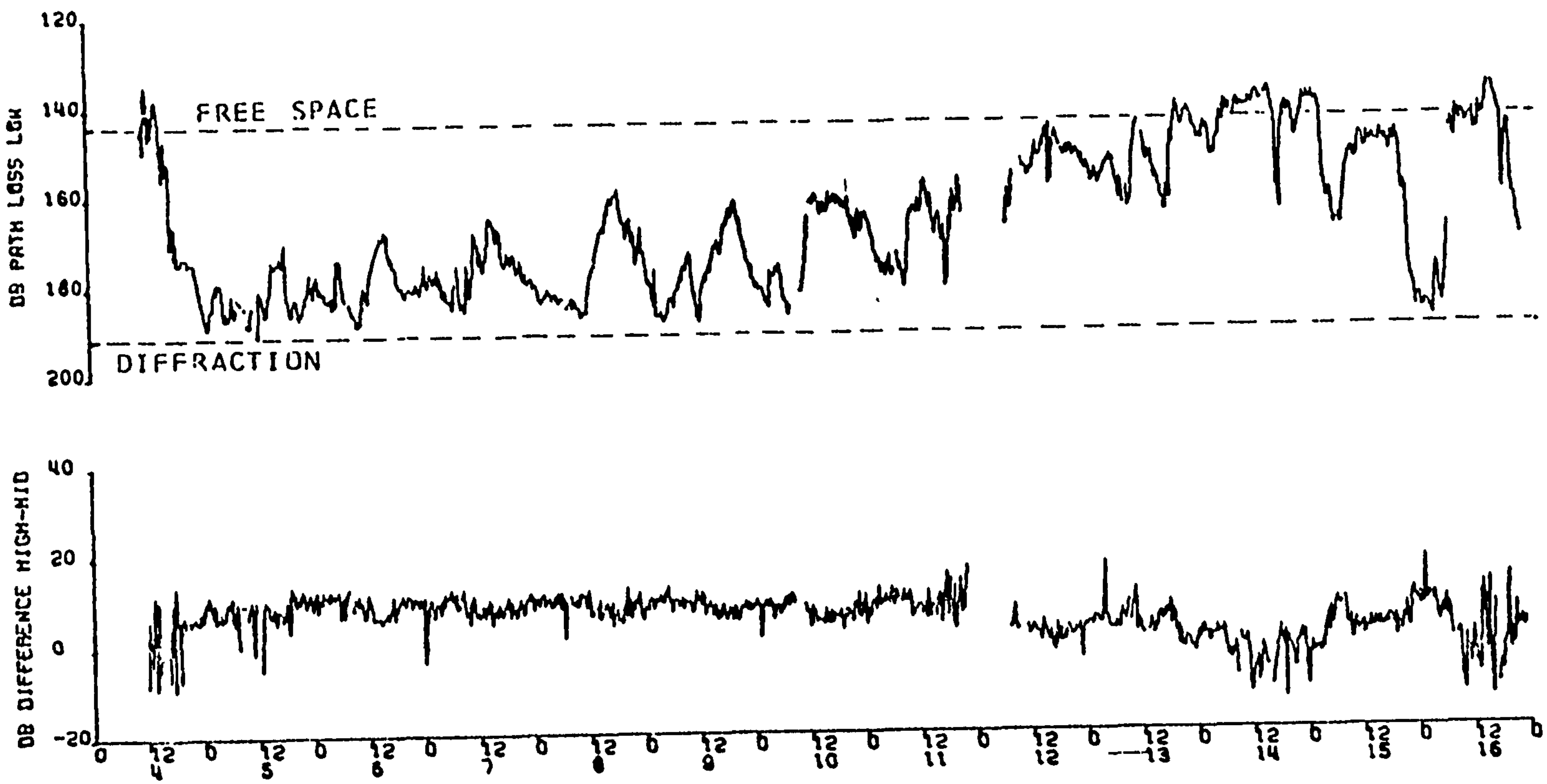

Figure 34. X-BAND. CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

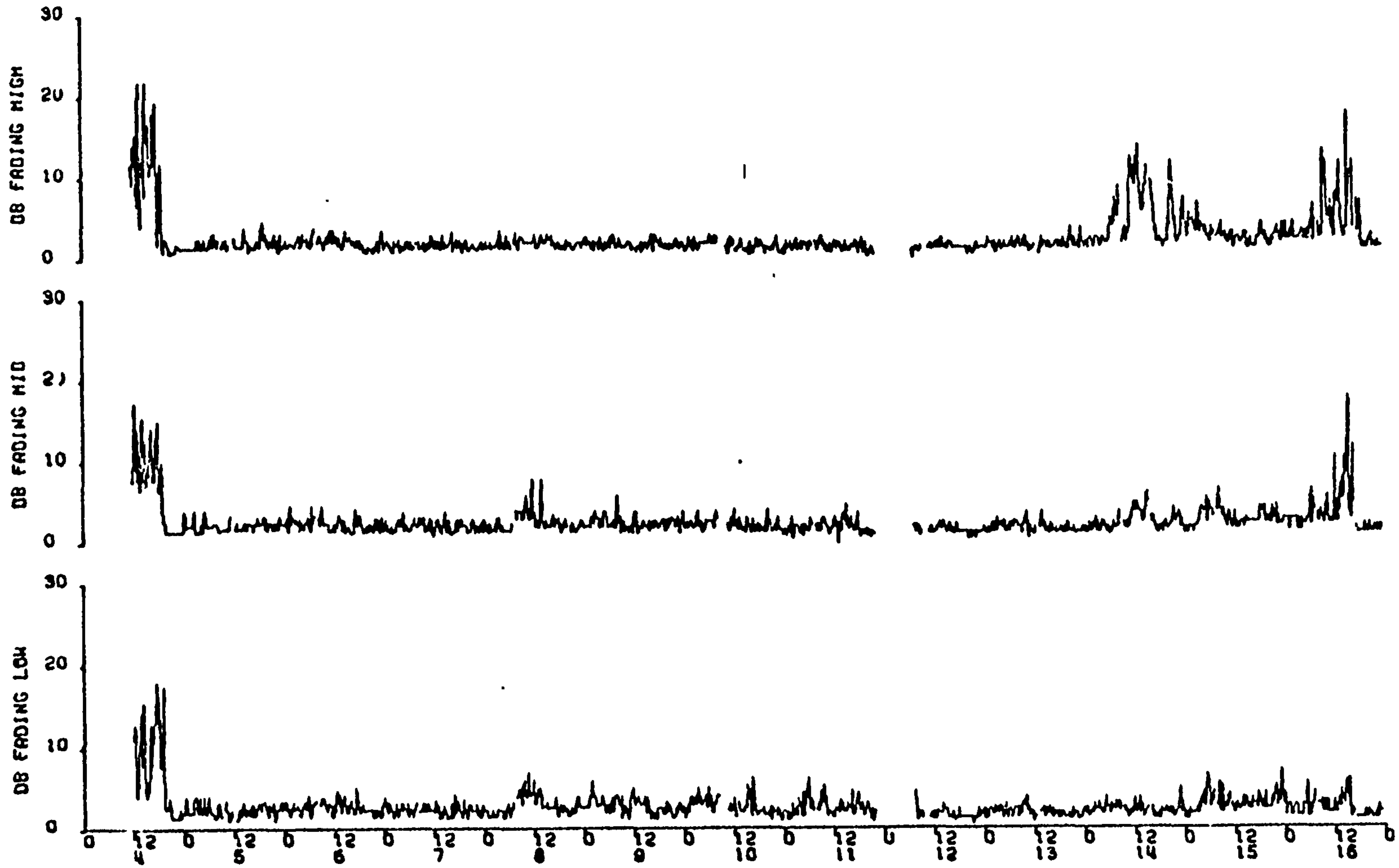

Figure 35. X BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

IX. TABLES

1. Performance characteristics of transmitter
2. Statistical presentation of July measurements for L-band
3. Statistical presentation of July measurements for S-band
4. Statistical presentation of July measurements for X-band
5. Statistical presentation of November measurements for L-band
6. Statistical presentation of November measurements for S-band
7. Statistical presentation of November measurements for X-band

L BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

HIGH-LOW			AVG FADING HIGH			ABS FADING HIGH		
1.0 %	>	20.0	0.0 %	>	20.0	0.0 %	>	20.0
33.8 %	>	15.0	0.0 %	>	15.0	1.2 %	>	15.0
82.5 %	>	10.0	0.3 %	>	10.0	3.3 %	>	10.0
93.5 %	>	6.0	0.5 %	>	8.0	5.2 %	>	8.0
96.4 %	>	3.0	1.9 %	>	6.0	7.9 %	>	6.0
98.2 %	>	0.0	2.8 %	>	5.0	10.4 %	>	5.0
99.4 %	>	-3.0	4.7 %	>	4.0	14.7 %	>	4.0
99.6 %	>	-6.0	7.3 %	>	3.0	20.5 %	>	3.0
100.0 %	>	-10.0	13.6 %	>	2.0	30.5 %	>	2.0
100.0 %	>	-15.0	28.7 %	>	1.0	52.2 %	>	1.0
100.0 %	>	-21.0						
TOTAL ENTRIES = 2508			TOTAL ENTRIES = 2508			TOTAL ENTRIES = 2508		

AVG FADING LOW			ABS FADING LOW		
0.0 %	>	20.0	0.4 %	>	20.0
0.1 %	>	15.0	4.1 %	>	15.0
1.5 %	>	10.0	44.1 %	>	10.0
6.3 %	>	8.0	68.2 %	>	8.0
24.0 %	>	6.0	85.6 %	>	6.0
41.0 %	>	5.0	92.0 %	>	5.0
61.0 %	>	4.0	96.2 %	>	4.0
78.6 %	>	3.0	98.5 %	>	3.0
91.0 %	>	2.0	99.6 %	>	2.0
97.3 %	>	1.0	99.8 %	>	1.0
TOTAL ENTRIES = 2504			TOTAL ENTRIES = 2503		

Table 2. Statistical Presentation of July Measurements for L-band

S BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

HIGH-LOW	AVG FADING HIGH	ABS FADING HIGH
0.0 % > 20.0	0.0 % > 20.0	0.0 % > 20.0
5.0 % > 15.0	0.0 % > 15.0	0.1 % > 15.0
96.7 % > 10.0	0.0 % > 10.0	0.2 % > 10.0
99.6 % > 6.0	0.0 % > 8.0	0.2 % > 8.0
100.0 % > 3.0	0.0 % > 6.0	0.2 % > 6.0
100.0 % > 0.0	0.1 % > 5.0	0.4 % > 5.0
100.0 % > -3.0	0.1 % > 4.0	0.5 % > 4.0
100.0 % > -6.0	0.1 % > 3.0	1.6 % > 3.0
100.0 % > -10.0	0.5 % > 2.0	4.8 % > 2.0
100.0 % > -15.0	4.1 % > 1.0	13.5 % > 1.0
100.0 % > -20.0		
TOTAL ENTRIES = 2550	TOTAL ENTRIES = 2554	TOTAL ENTRIES = 2554

AVG FADING LOW	ABS FADING LOW
0.0 % > 20.0	0.0 % > 20.0
0.0 % > 15.0	0.2 % > 15.0
0.0 % > 10.0	4.0 % > 10.0
0.0 % > 8.0	7.3 % > 8.0
0.4 % > 6.0	11.3 % > 6.0
1.0 % > 5.0	13.9 % > 5.0
3.7 % > 4.0	20.1 % > 4.0
7.1 % > 3.0	33.3 % > 3.0
11.9 % > 2.0	54.4 % > 2.0
18.3 % > 1.0	83.7 % > 1.0
TOTAL ENTRIES = 2555	TOTAL ENTRIES = 2555

Table 3. Statistical Presentation of July Measurements for S-band

X BAND CATALINA TO SAN CLEMENTE ISLAND JULY 1971

HIGH-LOW

0.0	% >	20.0
0.0	% >	15.0
73.4	% >	10.0
92.1	% >	6.0
99.1	% >	3.0
100.0	% >	0.0
100.0	% >	-3.0
100.0	% >	-6.0
100.0	% >	-10.0
100.0	% >	-15.0
100.0	% >	-20.0

TOTAL ENTRIES = 2258

AVG FADING HIGH

0.0	% >	20.0
0.0	% >	15.0
0.0	% >	10.0
0.0	% >	8.0
0.0	% >	6.0
0.0	% >	5.0
0.0	% >	4.0
0.0	% >	3.0
0.0	% >	2.0
1.1	% >	1.0

TOTAL ENTRIES = 2258

ABS FADING HIGH

0.0	% >	20.0
0.0	% >	15.0
0.0	% >	10.0
0.0	% >	8.0
0.0	% >	6.0
0.1	% >	5.0
0.2	% >	4.0
0.3	% >	3.0
0.9	% >	2.0
14.7	% >	1.0

TOTAL ENTRIES = 2258

AVG FADING LOW

0.0	% >	20.0
0.0	% >	15.0
0.0	% >	10.0
0.0	% >	8.0
0.0	% >	6.0
0.0	% >	5.0
0.0	% >	4.0
0.1	% >	3.0
0.9	% >	2.0
16.5	% >	1.0

TOTAL ENTRIES = 2258

ABS FADING LOW

0.0	% >	20.0
0.0	% >	15.0
0.0	% >	10.0
0.0	% >	8.0
0.1	% >	6.0
0.2	% >	5.0
0.4	% >	4.0
3.2	% >	3.0
22.5	% >	2.0
54.2	% >	1.0

TOTAL ENTRIES = 2258

Table 4. Statistical Presentation of July Measurements for X-band

L BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

HIGH-LOW	MID-LOW	HIGH-MID
45.1 % > 20.0 DB	0.4 % > 20.0 DB	0.1 % > 20.0 DB
77.7 % > 15.0 DB	12.0 % > 15.0 DB	0.1 % > 15.0 DB
94.9 % > 10.0 DB	55.5 % > 10.0 DB	4.3 % > 10.0 DB
98.3 % > 6.0 DB	82.1 % > 6.0 DB	94.2 % > 6.0 DB
99.2 % > 3.0 DB	95.9 % > 3.0 DB	97.4 % > 3.0 DB
99.6 % > 0.0 DB	98.0 % > 0.0 DB	99.0 % > 0.0 DB
99.7 % > -3.0 DB	99.5 % > -3.0 DB	99.6 % > -3.0 DB
100.0 % > -6.0 DB	99.8 % > -6.0 DB	100.0 % > -6.0 DB
100.0 % > -10.0 DB	100.0 % > -10.0 DB	100.0 % > -10.0 DB
100.0 % > -15.0 DB	100.0 % > -15.0 DB	100.0 % > -15.0 DB
100.0 % > -20.0 DB	100.0 % > -20.0 DB	100.0 % > -20.0 DB
TOTAL ENTRIES = 1128	TOTAL ENTRIES = 1133	TOTAL ENTRIES = 1127

FADING HIGH	FADING MIDDLE	FADING LOW
0.4 % > 20.0 DB	0.4 % > 20.0 DB	0.4 % > 20.0 DB
1.5 % > 15.0 DB	2.7 % > 15.0 DB	3.1 % > 15.0 DB
4.9 % > 10.0 DB	10.1 % > 10.0 DB	15.9 % > 10.0 DB
6.1 % > 8.0 DB	15.9 % > 8.0 DB	29.3 % > 8.0 DB
9.6 % > 6.0 DB	26.0 % > 6.0 DB	44.4 % > 6.0 DB
13.2 % > 5.0 DB	32.0 % > 5.0 DB	50.7 % > 5.0 DB
19.4 % > 4.0 DB	43.7 % > 4.0 DB	60.1 % > 4.0 DB
30.5 % > 3.0 DB	57.0 % > 3.0 DB	70.1 % > 3.0 DB
52.0 % > 2.0 DB	73.6 % > 2.0 DB	78.3 % > 2.0 DB
84.6 % > 1.0 DB	92.9 % > 1.0 DB	92.2 % > 1.0 DB
TOTAL ENTRIES = 1132	TOTAL ENTRIES = 1134	TOTAL ENTRIES = 1135

Table 5. Statistical Presentation of November Measurements for L-band

S BAND   CATALINA TO SAN CLEMENTE ISLAND   NOVEMBER 1971

HIGH-LOW	MID-LOW	HIGH-MID
9.5 % > 20.0 DB	0.1 % > 20.0 DB	0.0 % > 20.0 DB
67.4 % > 15.0 DB	2.7 % > 15.0 DB	0.4 % > 15.0 DB
95.5 % > 10.0 DB	47.5 % > 10.0 DB	1.4 % > 10.0 DB
97.2 % > 6.0 DB	95.7 % > 6.0 DB	56.3 % > 6.0 DB
98.3 % > 3.0 DB	97.8 % > 3.0 DB	94.6 % > 3.0 DB
99.3 % > 0.0 DB	98.8 % > 0.0 DB	97.6 % > 0.0 DB
99.6 % > -3.0 DB	99.6 % > -3.0 DB	98.7 % > -3.0 DB
99.9 % > -6.0 DB	99.8 % > -6.0 DB	99.5 % > -6.0 DB
100.0 % > -10.0 DB	99.9 % > -10.0 DB	100.0 % > -10.0 DB
100.0 % > -15.0 DB	99.9 % > -15.0 DB	100.0 % > -15.0 DB
100.0 % > -20.0 DB	100.0 % > -20.0 DB	100.0 % > -20.0 DB
TOTAL ENTRIES = 1121	TOTAL ENTRIES = 1127	TOTAL ENTRIES = 1120

FADING HIGH	FADING MIDDLE	FADING LOW
0.2 % > 20.0 DB	0.1 % > 20.0 DB	0.2 % > 20.0 DB
0.4 % > 15.0 DB	0.6 % > 15.0 DB	1.2 % > 15.0 DB
1.2 % > 10.0 DB	1.6 % > 10.0 DB	5.6 % > 10.0 DB
1.8 % > 8.0 DB	3.4 % > 8.0 DB	9.7 % > 8.0 DB
2.3 % > 6.0 DB	5.2 % > 6.0 DB	14.0 % > 6.0 DB
2.8 % > 5.0 DB	7.0 % > 5.0 DB	17.8 % > 5.0 DB
3.9 % > 4.0 DB	9.7 % > 4.0 DB	24.3 % > 4.0 DB
8.1 % > 3.0 DB	15.9 % > 3.0 DB	33.6 % > 3.0 DB
16.6 % > 2.0 DB	30.6 % > 2.0 DB	53.1 % > 2.0 DB
54.6 % > 1.0 DB	76.1 % > 1.0 DB	85.8 % > 1.0 DB
TOTAL ENTRIES = 1127	TOTAL ENTRIES = 1129	TOTAL ENTRIES = 1129

Table 6. Statistical Presentation of November Measurements for S-band

X BAND CATALINA TO SAN CLEMENTE ISLAND NOVEMBER 1971

HIGH-LOW	MID-LOW	HIGH-MID
1.1 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
27.0 % > 15.0 DB	0.2 % > 15.0 DB	0.4 % > 15.0 DB
65.4 % > 10.0 DB	2.2 % > 10.0 DB	14.4 % > 10.0 DB
75.1 % > 6.0 DB	34.1 % > 6.0 DB	57.2 % > 6.0 DB
84.1 % > 3.0 DB	78.1 % > 3.0 DB	75.1 % > 3.0 DB
89.1 % > 0.0 DB	89.3 % > 0.0 DB	85.6 % > 0.0 DB
92.1 % > -3.0 DB	94.0 % > -3.0 DB	93.3 % > -3.0 DB
95.2 % > -6.0 DB	97.8 % > -6.0 DB	96.7 % > -6.0 DB
97.3 % > -10.0 DB	99.5 % > -10.0 DB	99.1 % > -10.0 DB
99.5 % > -15.0 DB	99.9 % > -15.0 DB	100.0 % > -15.0 DB
100.0 % > -20.0 DB	100.0 % > -20.0 DB	100.0 % > -20.0 DB
TOTAL ENTRIES = 1107	TOTAL ENTRIES = 1107	TOTAL ENTRIES = 1107

FADING HIGH	FADING MIDDLE	FADING LOW
0.2 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
0.7 % > 15.0 DB	0.4 % > 15.0 DB	0.5 % > 15.0 DB
3.4 % > 10.0 DB	1.9 % > 10.0 DB	1.6 % > 10.0 DB
5.0 % > 8.0 DB	2.3 % > 8.0 DB	1.7 % > 8.0 DB
6.5 % > 6.0 DB	3.9 % > 6.0 DB	2.7 % > 6.0 DB
7.2 % > 5.0 DB	4.6 % > 5.0 DB	4.2 % > 5.0 DB
10.2 % > 4.0 DB	7.3 % > 4.0 DB	8.1 % > 4.0 DB
16.5 % > 3.0 DB	19.6 % > 3.0 DB	28.2 % > 3.0 DB
39.5 % > 2.0 DB	54.4 % > 2.0 DB	67.5 % > 2.0 DB
92.7 % > 1.0 DB	98.5 % > 1.0 DB	99.7 % > 1.0 DB
TOTAL ENTRIES = 1109	TOTAL ENTRIES = 1109	TOTAL ENTRIES = 1108

Table 7. Statistical Presentation of November Measurements for X-band

X. APPENDIX (Meteorological Data)

The purpose of the measurement program described in this report was to provide reliable data to permit prediction of antenna performance in the oceanic evaporation duct for various antenna heights and frequencies. Therefore, extensive measurements were done in various seasons without the attempt to correlate meteorological data with radio measurements obtained simultaneously (this has been done successfully and is described in reference 1). However, it is the purpose of this report to document all pertinent data. For this reason, meteorological data available for the periods of the radio measurements are presented without further analysis. The meteorological data are published in a separate volume which is available upon request.* The meteorological data consist of two refractive index profiles obtained with airborne microwave refractometers on 11 November 1971 and surface weather observations from San Clemente Island. In general, the meteorology during the July measurement period was characterized by thermal stability in the lower atmosphere with an almost continuous stratus cloud deck. The November measurement encountered the whole range of meteorological conditions from strong subsidence and advection inversions (Santa Ana condition) to neutral and unstable atmospheric conditions. The boat measurements covering a period of November 1970 to April 1971 likewise encountered the whole spectrum of weather conditions found in this area.

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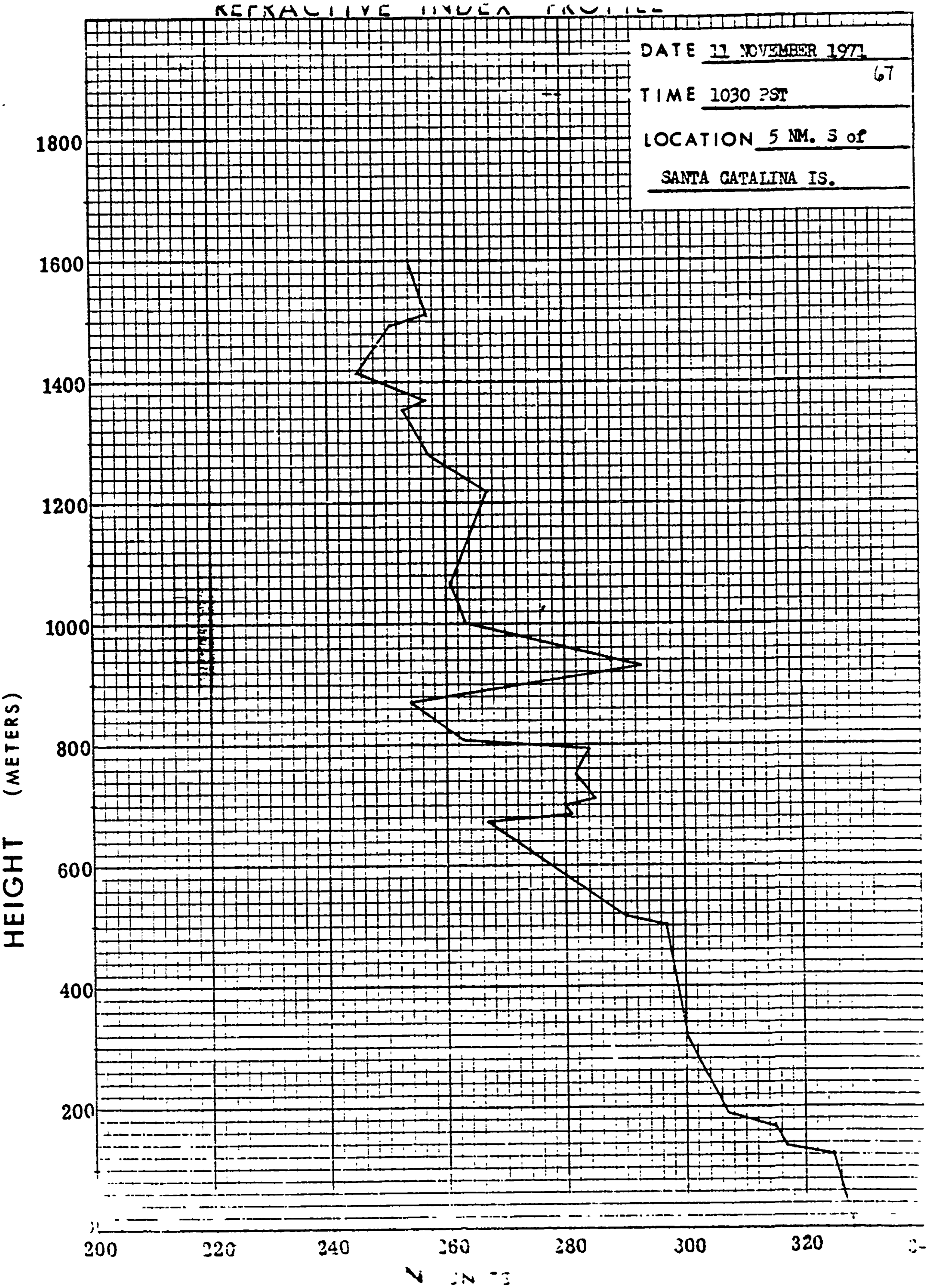
* Meteorological data is now included in this volume--see following pages.

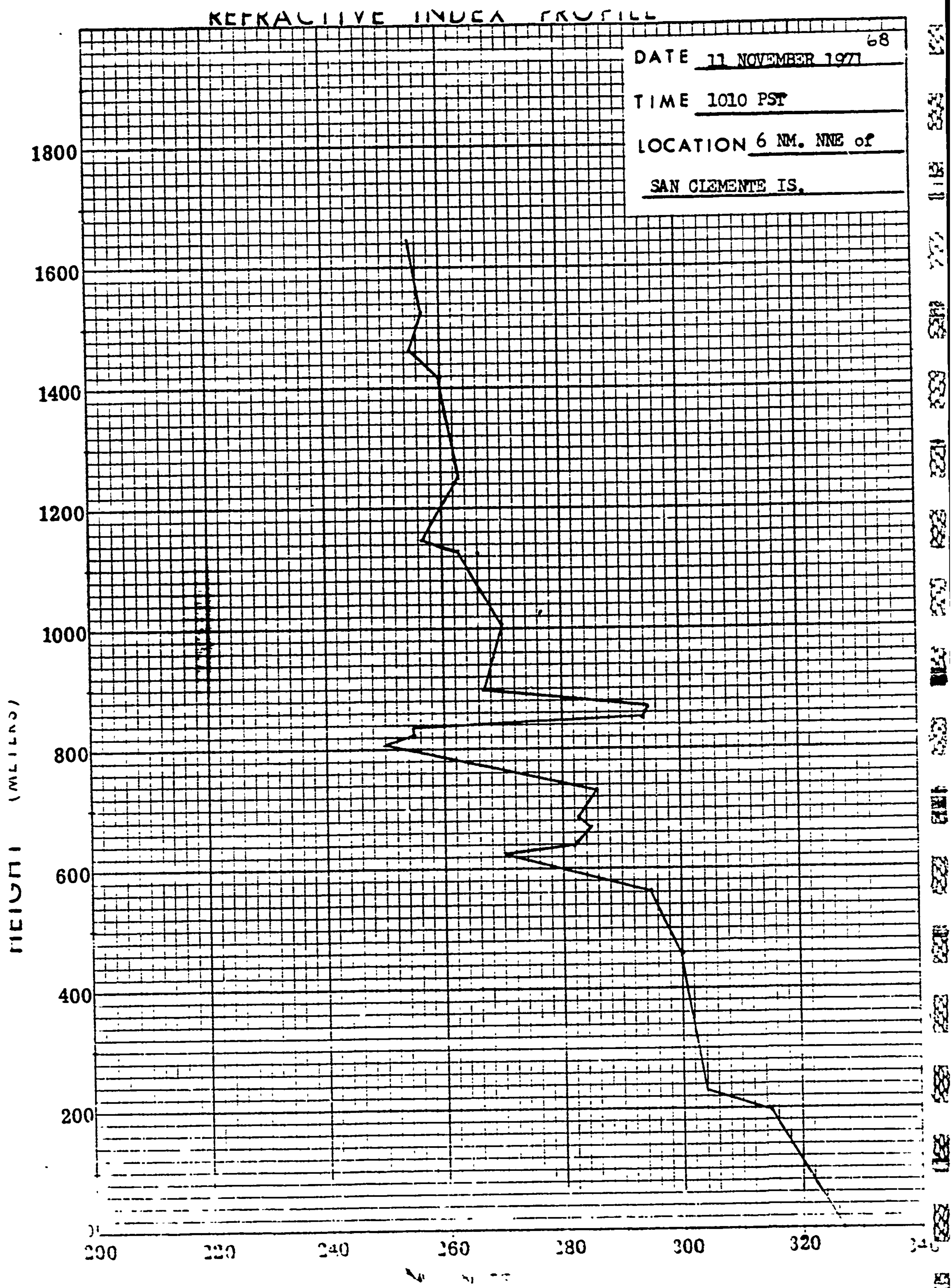
Meteorological Data

Meteorological data available for the July 1971 and November 1971 measurement periods are presented without further analysis. The meteorological data consist of two refractive index profiles obtained with airborne microwave refractometers on 11 November 1971 and surface weather observations from San Clemente Island. In general, the meteorology during the July measurement period was characterized by thermal stability in the lower atmosphere with an almost continuous stratus cloud deck. The November measurement encountered the whole range of meteorological conditions from strong subsidence and advection inversions (Santa Ana condition) to neutral and unstable atmospheric conditions. The boat measurements covering a period of November 1970 to April 1971 likewise encountered the whole spectrum of weather conditions found in this area.

REFRACTIVE INDEX PROFILES

24 November 1971


REFRACTIVE INDEX PROFILE
DATE 11 NOVEMBER 1971
67
TIME 1030 PST
LOCATION 5 NM. S of
SANTA CATALINA IS.
HEIGHT (METERS)
1800
1600
1400
1200
1000
800
600
400
200
200
220
240
260
280
300
320



REFRACTIVE INDEX PROFILE
68
DATE 11 NOVEMBER 1971
TIME 1010 PST
LOCATION 6 NM. NNE of
SAN CLEMENTE IS.
HEIGHT (METERS)
1800
1600
1400
1200
1000
800
600
400
200
200
220
240
260
280
300
320
340

SURFACE WEATHER OBSERVATIONS

16-26 July 1971

OPNAV FORM 3140-6 (REV. 8-61)

NSAS FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

Station: NWSED San Clemente Is.

Date: 16 July 1971

70

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	04		[illegible]	607 1/11			[illegible]
R	[illegible]	[illegible]	3	[illegible]	H	[illegible]	[illegible]	58	30	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	[illegible]	[illegible]	H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	400 16// 62			[illegible]
R	[illegible]	[illegible]	2	[illegible]	F	113	[illegible]	59	00	[illegible]		[illegible]				[illegible]
R	[illegible]	E5⊕	2	[illegible]	F	119	62	57	27	02		[illegible]				LH
R	[illegible]	E5⊕	2	2	F	[illegible]	62	58	28	02		[illegible]	112 16//			LH
R	[illegible]	E6⊕	2	2	F	[illegible]	65	60	00	00		989				LH
R	[illegible]	E6⊕	2	2	F	124	67	60	00	00		990				LH
R	0958	A5⊕	2	2	F	127	61	59	27	04		991	210 16// 62			LH
RS	1058	E7⊕	3	3	F	136	67	59	20	02		993				RS
R	1158	E7⊕	3	3	F	134	67	59	23	04		993				LH
R	[illegible]	E7⊕	3	3	H	137	[illegible]	60	00	00		[illegible]	229 16//			RA
R	1358	E7⊕	3	3	H	126	[illegible]	59	24	05		991	⊕13			RB
R	1458	E7⊕	3	3	H	113	67	59	26	06		988				[illegible]
R	1558	E5⊕	3	3	H	109	[illegible]	58	27	10		986	727 16// 59			[illegible]
R	1658	E5⊕	3	[illegible]	H	113	[illegible]	57	22	[illegible]		988				RB
R	1758	E6⊕	3	[illegible]	H	111	64	57	24	[illegible]		986				RB
R	1858	E6⊕	3	[illegible]	H	116	64	57	25	03		988	207 16//			[illegible]
R	[illegible]	E6⊕	3	[illegible]	H	119	64	57	24	05		989				RA
R	2058	E6⊕	3	[illegible]	H	132	63	59	00	00		992				RA
R	2158	E6⊕	3	[illegible]	H	137	63	59	23	03		993	217 1690 59			RA
R	[illegible]	E6⊕	3	[illegible]	H	134	63	59	00	00		993				RB
R	2358	E6⊕	3	[illegible]	H	132	64	60	00	00		992				LH

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OP 0867

OPNAV FORM 3140-7 (4-65)
0207-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED San Clemente Island DATE 16 July 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	Lowest layer AMT 22	Lowest layer TYPE & DIR 23	Lowest layer HEIGHT 24	Second layer AMT 25	Second layer TYPE & DIR 26	Second layer HEIGHT 27	SUMMATION TOTAL 28	Third layer AMT 29	Third layer TYPE & DIR 30	Third layer HEIGHT 31	SUMMATION TOTAL 32	Fourth layer AMT 33	Fourth layer TYPE & DIR 34	Fourth layer HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0059	29.635	64	60	81	10	10	St	E6	4				4				4			10	8	.010		
0159	[illegible]	62	60	87	10															10				
0258	[illegible]	62	60	87	10															10				
0358	[illegible]	62	60	87	10	10	ST	E5	4				4				4			10	4	.000		
0458	29.685	62	60	[illegible]	10															10				
0558	29.700	62	60	87	10															10				
0658	29.700	62	60	87	10	10	St	E5	4				4				4			10	1	.035		
0758	29.705	65	62	84	10															10				
0858	29.720	67	63	78	10															10				
0958	29.730	66	62	78	10	10	St	A5	4				4				4			10	2	.030		
1058	29.750	67	62	75	10															10				
1158	29.745	67	62	75	10															10				
1258	29.755	69	[illegible]	[illegible]	10	10	St	E7	4				4				4			10	2	.025		
1358	29.725	68	62	73	10															10				
1458	29.720	67	61	73	10															10				
1558	29.675	[illegible]	61	75	10	10	SE	E6	4				4				4			10	7	.080		
1658	29.685	65	60	75	10															10				
1758	29.690	64	60	78	10															10				
1858	29.695	64	60	78	10	10	SE	E6	4				4				4			10	2	.020		
1958	29.705	64	60	78	10															10				
2058	29.740	63	60	84	10															10				
2158	29.745	63	61	87	7	7	SC	E6	0			7	0			7	20	~~0~~		7	2	.030		
2258	29.745	63	61	87	7															7				
2358	29.740	64	61	87	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP (°F) 47	MIN. TEMP (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $H_SP_SD_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		[illegible]	[illegible]										
	0352	1	0	0	0	65	[illegible]		0								
	0952	2	0	0	0	67	62		0								
	1552	3	0	0	0	61	66		0								
	2152	4	0	0	0	66	63		0								
	MID		0	0	0	64	63										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	[illegible]	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	[illegible]	1006.7	1004.8	1007.3
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	[illegible]	1006.7	1004.8	1007.3
BAROGRAPH 64	1005.0	1007.2	1005.4	1002.2
BAR. CORR. 65	-0.4	-0.5	-0.3	+0.1

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIREC-TION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
69	62	0	0	0	10	27	1558					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT	0430
			F	0435	1350
			H	1355	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-6 (REV. 8-61) | WBAN FORM 10A

STATION: NWSED San Clemente Is. | 72

DATE: 17 July 1971

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(14a)	(14b)	Observer's initials (15)
R	0057	M7 ⊕	3	[illegible]	H	132	64	60	06	01		943	802 1500			LH
R	0157	E7 ⊕	3	[illegible]	H	130	64	59	20	04		942				LH
R	[illegible]	E7 ⊕	3	[illegible]	H	132	63	[illegible]	14	02		[illegible]				LH
R	[illegible]	M7 ⊕	3	[illegible]	[illegible]	[illegible]	[illegible]	59	20	04		[illegible]	707 1500 62			LH
R	[illegible]	E7 ⊕	4	[illegible]	[illegible]	134	[illegible]	[illegible]	20	[illegible]		943				LH
R	[illegible]	E7 ⊕	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	02		[illegible]				LH
R	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	220 1550			RA
RS	[illegible]	[illegible]	4		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	06		[illegible]				RA
R	[illegible]	[illegible]	[illegible]		[illegible]	154	[illegible]	[illegible]	23	05		944				RA
R	[illegible]	[illegible]	[illegible]		[illegible]	154	[illegible]	[illegible]	22	04		[illegible]	108 1230 62			RA
RS	[illegible]	[illegible]	5		[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]		[illegible]				RA
R	1157	[illegible]	[illegible]		[illegible]	152	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]				RA
R	[illegible]	[illegible]	7			151	[illegible]	[illegible]	24	06		[illegible]	223 1030			RA
R	[illegible]	[illegible]	[illegible]			143	[illegible]	[illegible]	24	08		[illegible]				RA
R	1457	[illegible]	7			142	[illegible]	[illegible]	[illegible]	09		[illegible]				RA
RS	1557	E15 ⊕	7			134	[illegible]	57	26	08		[illegible]	717 1500 72			LH
R	1657	E5 ⊕	7			134	[illegible]	[illegible]	24	08		942				LH
R	1757	E15 ⊕	7			134	[illegible]	[illegible]	27	07		[illegible]				LH
R	1857	M12 ⊕	7			132	[illegible]	57	30	06		[illegible]	802 1500			LH
R	1957	E12 ⊕	7			138	[illegible]	[illegible]	29	06		944				LH
R	2057	E12 ⊕	7			157	[illegible]	[illegible]	33	03		[illegible]				LH
RS	2157	10 ⊕	7			147	[illegible]	[illegible]	27	03		947	115 1500 72			LH
R	2258	10 ⊕	7			147	62	57	20	06		947				LH
R	[illegible]	[illegible]	7			146	[illegible]	[illegible]	20	04		946				RA

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

GP 0087

OPNAV FORM 3140-7 (4-65)
S/N 0107-333-5081

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED San Clemente Island DATE 17 July 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.740	64	61	87	8	8	Sc	M7	0			8	0			8	0			8	8	.005		
0158	29.735	64	61	84	8															8				
0258	29.740	63	61	90	8															8				
0358	29.720	62	60	90	8	8	Sc	M7	0			8	0			8	0			8	7	.020		
0458	[illegible]	63	60	87	8															8				
0558	[illegible]	63	61	87	8															8				
0658	29.730	[illegible]	61	81	5	5	Sc	E7	2	Ac	190	8	0			8	0			8	2	.060		
0758	[illegible]	[illegible]	63	76	[illegible]															9				
0858	[illegible]	[illegible]	62	[illegible]	7															7				
0958	[illegible]	[illegible]	63	61	7	3	Cu	15	4	Ac	E150	7	0			7	0			7	1	.025		
1058	[illegible]	71	65	61	4															4				
1158	29.800	7[illegible]	62	[illegible]	2															2				
1258	[illegible]	[illegible]	62	57	2	2	Ac	150	0			2	0			2	0			2	8	.010		
1358	[illegible]	[illegible]	[illegible]	57	2															2				
1458	[illegible]	[illegible]	[illegible]	[illegible]	2															2				
1558	29.745	70	[illegible]	63	7	7	Sc	E15	0			7	0			7	0			7	7	.050		
1658	29.745	[illegible]	61	65	8															8				
1758	[illegible]	[illegible]	60	[illegible]	8															8				
1858	[illegible]	65	60	75	7	8	Sc	M12	0			8	0			8	0			8	8	.005		
1958	29.760	[illegible]	[illegible]	75	8															8				
2058	[illegible]	64	60	81	9															9				
2158	[illegible]	65	[illegible]	78	3	3	Ci	10	0			3	0			3	0			3	1	.045		
2258	29.775	62	57	84	2															2				
2358	[illegible]	[illegible]	[illegible]	[illegible]	0															0				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX TEMP. (°F) 47	MIN TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_3 H_3 $M_3P_3D_3$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	64	62	X	X	X	X	X	X	X	X		
	0352	1	0	0	0	64	62		0								
	0952	2	0	0	0	72	62		0								
	1552	3	0	0	0	72	70		0								
	2152	4	0	0	0	70	63		0								
	MID	X	0	0	0	73	62	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSVD. BAR. 61	1006.4	1009.3	1007.2	1008.6
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1006.4	1009.3	1007.2	1008.6
BAROGRAPH 64	1006.8	1009.0	1007.0	1008.3
BAR. CORR. 65	-0.4	+0.3	+0.2	+0.3

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR PRECIP WATER EQUIV (Ins.) 68	24-HR. SNOWFALL UNMELTED (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
72	62	0	0	0	[illegible]	[illegible]	1555					6	6		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			F	CONT.	1250

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED ____ KNOTS

ASSOCIATED DIRECTION

TIME

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TIMES [illegible] SR - 0458 - SS 1904

OPNAV FORM 3140-6 (REV. 6-61) — WMO FORM 100

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NALCED SAN CLEMENTE IS.

DATE: 18 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	O	7			142	62	58	21	03		995	805			RR
R	0158	10 ⊕	7			139	[illegible]	58	00	00		994				RR
R	0253	10 ⊕	7			138	[illegible]	[illegible]	00	00		[illegible]				RR
R	0358	O	5		H	139	63	58	30	00		994	603 60			RR
R	[illegible]	O	5		H	142	60	58	26	02		995				RR
R	0558	10 ⊕	5		H	143	61	58	26	04		996				RR
R	0658	10 ⊕	7			147	68	60	30	00		997	203 1500			RR
RS	0758	E10 ⊕	7			147	69	58	27	03		997				RR
R	0858	E10 ⊕	7			146	70	58	28	06		996				LH
R	0958	B10 ⊕	7			147	70	57	27	07		997	500 1500 60			LH
R	1058	E10 ⊕	7			146	71	56	27	05		996				LH
RS	1158	10 ⊕	7			143	71	56	27	08		995				LH
R	1258	10 ⊕	7			138	71	56	27	07		994	708 1500			LH
R	1358	10 ⊕	7			136	71	57	27	11		993				LH
RS	1458	E10 ⊕	7			130	71	57	25	08		992				LH
R	1558	E10 ⊕	7			126	70	56	26	09		[illegible]	712 1500 71			RR
R	1658	E10 ⊕	10			124	68	56	26	10		990				RR
R	1758	E10 ⊕	10			124	65	57	26	10		990				RR
R	1858	E10 ⊕	10			121	63	57	27	08		989	705 1511			RR
RS	1958	E6 ⊕	5		H	132	63	58	25	06		992				RR
R	2058	E5 ⊕	5		H	142	63	58	24	05		995				RR
R	2158	E5 ⊕	5		H	142	62	58	22	07		995	120 1611 71			RR
R	2258	E5 ⊕	5		H	138	61	58	22	08		994				RR
R	2358	E5 ⊕	5		H	132	61	58	22	05		992				LH

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NAVSEC SAN CLEMENTE IS. DATE 18 JULY 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	TYPE & DIR 23	HEIGHT 24	SECOND LAYER AMT. 25	TYPE & DIR. 26	HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT 29	TYPE & DIR. 30	HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT 33	TYPE & DIR 34	HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0055	[illegible]	[illegible]	60	87	0	0			0			0	0			0	0			0	3	,015		
0158	[illegible]	[illegible]	60	87	2															2				
0258	[illegible]	[illegible]	60	87	1															1				
0358	[illegible]	[illegible]	59	93	0	0			0			0	0			0	0			0	1	,010		
0458	29.770	60	59	93	0															0				
0558	[illegible]	61	59	[illegible]	1															1				
0658	29.735	63	63	75	2	2	SC	10	0			2	0			2	0			2	2	.025		
0758	[illegible]	[illegible]	63	70	6															6				
0857	[illegible]	70	62	66	7															7				
0958	[illegible]	70	62	[illegible]	8	8	Sc	B10	0			8	0			8	0			8	5	,000		
1058	29.750	70	61	61	8															8				
1158	[illegible]	71	62	59	5															5				
1258	[illegible]	71	62	57	4	4	Sc	10	0			4	0			4	0			4	7	,025		
1358	[illegible]	71	62	61	5															5				
1458	29.73[illegible]	71	62	61	6															6				
1558	[illegible]	70	61	61	8	8	SC	E10	0			8	0			8	0			8	7	[illegible]		
1658	29.720	[illegible]	61	65	7															7				
1758	29.720	65	60	75	10															10				
1858	29.72[illegible]	63	59	81	10	10	SC	E10	4				4				4			10	7	.015		
1958	[illegible]	63	60	84	10															10				
2058	29.77[illegible]	63	60	84	10															10				
2158	29.77[illegible]	62	60	87	10	10	SE	E5	4				4				4			10	1	[illegible]		
2258	[illegible]	[illegible]	59	90	10															10				
2358	[illegible]	61	59	90	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_s H_s $M_sP_sD_s$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		62	60										
	0352	1	0	0	0	63	59		0								
	0952	2	0	0	0	70	60		0								
	1552	3	0	0	0	71	70		0								
	2152	4	0	0	0	70	62		0								
	MID		0	0	0	62	61										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	[illegible]	0955	1555	2155
ATT. THERM. 60				
OBSD. BAR. 61	[illegible]	1006	[illegible]	[illegible]
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	[illegible]	1008.6	[illegible]	1008.[illegible]
BAROGRAPH 64	[illegible]	1007.4	[illegible]	1007.3
BAR. CORR. 65	[illegible]	[illegible]	0	[illegible]

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	DIRECTION 72	TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	MIDNIGHT TO MIDNIGHT 79	80	81
71	60	0	0	0	11	27 W	1357					6	6		

PRECIP. AND THORSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			F	03[illegible]	08[illegible]
			H	1220	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140/6 (REV. 6-61) NAVAER FORM 100

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED San Clemente Is.

DATE: 19 July 1971

Type (1)	Time (GST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	M5	5		H	128	[illegible]	58	23	06		991	714 15//			LH
R	0158	5	5		H	124	60	57	24	04		990				LH
R	0258	5	5		H	123	60	57	26	07		990				LH
R	0357	3	5		H	122	60	57	24	06		[illegible]	605 15// 60			LH
R	0458	3	2	*	F	126	61	59	27	05		991				LH
R	[illegible]	[illegible]	1/2	*	F	[illegible]	[illegible]	60	27	[illegible]		[illegible]				[illegible]
S	[illegible]	[illegible]	[illegible]	3/4	F				27	05		[illegible]				[illegible]
R	[illegible]	[illegible]	[illegible]		F	[illegible]	[illegible]	[illegible]	24	04		[illegible]	[illegible]			[illegible]
R	0758	[illegible]	4		F	142	62	60	23	07		[illegible]	VSBY LWR 5 F[illegible]			[illegible]
R	[illegible]	[illegible]	[illegible]		F	147	62	59	24	04		997	F[illegible]			[illegible]
R	[illegible]	[illegible]	5		H	147	64	59	27	06		997	110 16// 60			[illegible]
RS	1058	25	5		H	147	66	58	27	08		997	⊕11			BCS
R	1158	[illegible]	5		H	143	67	57	25	09		99[illegible]				[illegible]
R	[illegible]	[illegible]	7			13[illegible]	67	5[illegible]	25	07		[illegible]	808 16//			[illegible]
R	1358	[illegible]	7			136	67	[illegible]	27	12		993	[illegible] 13			[illegible]
R	1458	[illegible]	[illegible]			134	67	56	29	12		99[illegible]				BB
R	1558	[illegible]	[illegible]			126	65	56	26	10		991	712 16// 67			BK
R	1658	[illegible]	7			121	65	57	27	10		990	BINOVC			BK
R	1758	[illegible]	6		H	123	64	57	27	09		990	BINOVC			BK
R	1859	[illegible]	5		H	124	62	58	27	09		990	BINOVC 502 16//			BK
R	1959	[illegible]	5		H	126	62	58	25	06		991				BK
R	2055	[illegible]	5		H	136	62	58	25	06		993				BK
R	2158	[illegible]	5		H	136	61	58	24	07		[illegible]	110 1600 67			BK
R	2257	[illegible]	5		H	137	61	59	25	05		994				BK
R	2357	[illegible]	5		H	132	61	58	24	08		99[illegible]				[illegible]

A synoptic observation, in WMO code format FM12A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-65)
0107-711-1001

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DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED San Clemente Island DATE 19 July 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL HUMIDITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA — LOWEST LAYER AMT 22	TYPE & DIR. 23	HEIGHT 24	SECOND LAYER AMT 25	TYPE & DIR. 26	HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT 29	TYPE & DIR. 30	HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT 33	TYPE & DIR. 34	HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.730	60	59	93	10	10	Sc	M5	U															
0158	29.7[illegible]	60	59	93	10								U				U			10	7	.040		
0258	29.715	60	59	93	10															10				
0358	29.715	60	57	[illegible]	10	10	Sc	M13	U											10				
0458	29.725	61	60	93	10								U				U			10	6	.015		
0558	29.740	[illegible]	[illegible]	100	[illegible]															10				
0658	29.755	60	60	100	10	10	F	W3	U											10				
0758	29.770	62	61	93	10								U				U			10	2	.040		
0858	29.785	[illegible]	[illegible]	92	10															10				
0958	29.755	64	61	84	10	10	Sc	33	U											10				
1058	29.785	66	61	75	10								U				U			10	1	.030		
1158	29.775	67	61	70	10															10				
1258	29.760	67	60	68	10	10	Sc	E7	U											10				
1358	29.760	67	60	68	10								U				U			10	8	.025		
1458	29.745	[illegible]	[illegible]	[illegible]	[illegible]															10				
1558	29.725	65	60	73	10	10	St	E7	U											10				
1658	29.720	65	60	75	10								U				U			10	7	.035		
1758	29.715	64	60	78	10															10				
1858	29.720	62	60	84	10	10	St	E7	U											10				
1958	29.725	62	60	84	8								U				U			10	5	.005		
2058	29.750	62	60	84	8															8				
2158	29.750	61	59	90	8	8	St	E60	0			8	0			8	0			8				
2258	29.755	61	59	90	8															8	1	.030		
2358	[illegible]	61	59	90	10															8				
																				10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		61	[illegible]										
	0352	1	0	0	0	[illegible]	[illegible]		0								
	0952	2	0	0	0	[illegible]	[illegible]		0								
	1552	3	0	0	0	67	64		0								
	2152	4	0	0	0	65	61		0								
	MID		[illegible]	0	0	[illegible]	[illegible]										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0752	0955	1555	2155
ATT. THERM. 60				
OBSERVD. BAR. 61	[illegible]	1008.[illegible]	[illegible]	1007.4
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	[illegible]	1008.5	[illegible]	1007.4
BAROGRAPH 64	1006.2	1008.0	1006.0	1007.2
BAR. CORR. 65	[illegible]	[illegible]	0	+0.2

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED	DIRECTION	TIME (L.S.T.)	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	MIDNIGHT TO MIDNIGHT 79	80	81
67	[illegible]	0	0	0	17	[illegible]	[illegible]					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 85	BEGAN 87	ENDED 88
			H	Cont	[illegible]
			F	0430	0915
			H	0915	1230
			H	1730	Cont

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

FH

OPNAV FORM 3140-6 (REV. 6-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED [illegible] IS.

DATE: 20 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	[illegible]	E [illegible]	[illegible]		H	[illegible]	61	57	28	07		991	527 16//			RS
R	[illegible]	E [illegible]	[illegible]		H	[illegible]	[illegible]	57	24	[illegible]		991				RR
R	0258	E6	5		H	134	60	57	26	07		990				RR
R	[illegible]	[illegible]	5		H	[illegible]	[illegible]	[illegible]	27	09		[illegible]	500 16// 60			RR
R	0455	E [illegible]	5		H	134	60	56	28	08		993				RR
R	0558	E7	5		H	135	[illegible]	57	27	06		993				R[illegible]
R	0658	B7	5		H	137	61	57	28	04		994	208 16//			RK
R	0755	A6	6		H	137	62	57	27	06		994	⊕14			RK
R	0855	E [illegible]	6		H	137	64	57	30	05		994				BK
R	0955	E8	7			137	65	58	27	09		994	400 16// 60			BK
R	1055	E8	7			137	66	58	27	09		99[illegible]				BK
R	1155	E8	7			134	66	57	26	09		993				BK
R	1255	E8	7			132	67	57	27	11		992	805 16//			BK
R	1355	A8	7			126	67	57	27	10		991	⊕15			BK
R	1455	E8	7			121	61	57	27	08		989				BK
R	1558	A7	7			114	66	58	27	08		987	717 16// 67			LH
R	1658	E7	7			111	64	57	28	08		986				LH
R	1756	E7	7			111	62	57	29	07		986				LH
R	1858	B6	7			118	62	57	29	06		988	303 16//			LH
R	1958	E6	7			121	62	57	29	06		989				LH
R	2057	E6	7			124	61	57	29	07		990				LH
R	2158	M5	7			124	61	58	28	07		990	107 16// 67			LH
R	2257	E5	7			124	61	58	29	06		990				LH
R	2359	E6	7			124	61	58	27	05		990				BK

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

GP 0857

OPNAV FORM 3140-7 (9-68)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

FBAN 10B

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STATION NWSED SAN CLEMENTE IS DATE 30 JULY 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT 29	THIRD LAYER TYPE & DIR 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
00[illegible]	29.770	61	57	87	10	10	St	E6	4				4				4			10	8	.020		
01[illegible]	29.725	60	58	90	10															10				
02[illegible]	29.721	60	58	93	10															10				
03[illegible]	29.770	60	58	90	10	10	St	E6	4				4				4			10	5	.020		
04[illegible]	29.750	60	[illegible]	87	10															10				
0558	29.735	60	58	90	10															10				
0658	29.755	61	59	87	10	10	St	B37	U				U				U			10	3	.025		
0758	29.755	62	59	84	10															10				
0858	29.755	64	60	78	10															10				
0958	29.755	65	61	78	10	10	St	E8	U				U				U			10	4	.000		
1058	29.755	66	61	75	10															10				
1158	29.745	66	60	73	10															10				
1258	29.740	67	61	70	10	10	St	E8	U				U				U			10	8	.015		
1358	29.725	67	61	70	10															10				
1458	29.710	66	60	73	10															10				
1558	29.690	66	61	75	10	10	St	A7	U				U				U			10	7	.050		
1658	29.680	64	60	78	10															10				
1758	29.680	62	59	84	10															10				
1858	29.700	62	59	84	10	10	St	B6	U				U				U			10	3	.010		
1958	29.710	62	59	84	10															10				
2058	29.720	61	59	87	10															10				
2158	29.720	61	58	90	10	10	St	M5	U				U				U			10	1	.020		
2258	29.720	61	59	90	10															10				
2358	29.720	61	59	90	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	61	60	X	X	X	X	X	X	X	X		
	0252	1	0	0	0	61	60		0								
	0552	2	0	0	0	65	60		0								
	1552	3	0	0	0	67	65		0								
	2152	4	0	0	0	66	61		0								
	MID	X	0	0	0	61	61	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0255	[illegible]55	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	1005.[illegible]	1007.6	1005.4	1006.4
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1006.[illegible]	1007.[illegible]	1005.4	1006.4
BAROGRAPH 64	1006.6	1007.8	1005.0	1006.0
BAR. CORR. 65	[illegible]	-0.2	+0.4	+0.4

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
67	60	0	0	0	11	W	1258					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			[illegible]	CONT	0925

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-6 (REV. 3-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: UWSED SAN CLEMENTE ISLAND

DATE: 21 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer initials (14)
R	[illegible]	[illegible]	7			[illegible]	[illegible]	[illegible]	27	[illegible]		[illegible]	203 16//			[illegible]
R	[illegible]	[illegible]	7			119	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	7			116	61	[illegible]	28	04		[illegible]				[illegible]
RS	[illegible]	[illegible]	4		F	114	[illegible]	[illegible]	27	[illegible]		[illegible]	[illegible] 16// 61			BK
R	[illegible]	[illegible]	5		F	[illegible]	61	58	27	[illegible]		[illegible]				LK
RS	[illegible]	[illegible]	[illegible]		F	[illegible]	61	[illegible]	27	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	[illegible]		F	[illegible]	[illegible]	57	25	04		[illegible]	207 16//			RK
S	0705	A4⊕	3	3	F				26	04		940				[illegible]
R	[illegible]	[illegible]	5		F	[illegible]	62	59	23	[illegible]		[illegible]				[illegible]
RS	[illegible]	[illegible]	5		[illegible]	[illegible]	65	59	[illegible]	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	5		H	130	[illegible]	[illegible]	[illegible]	04		[illegible]	⊕15 103 16// 61			[illegible]
R	[illegible]	[illegible]	5		H	132	67	58	30	03		[illegible]				[illegible]
R	[illegible]	E7⊖	3	3	H	123	68	58	27	05		991				[illegible]
R	[illegible]	[illegible]6⊕	3	3	H	126	69	58	30	06		991	803 16//			[illegible]
R	[illegible]	[illegible]	3	3	H	123	69	58	26	05		990				[illegible]
R	[illegible]	E6⊖	3	3	H	123	68	58	29	03		[illegible]				[illegible]
R	[illegible]	B5⊕	3	3	H	119	68	58	23	06		[illegible]	708 16// 69			[illegible]
R	[illegible]	E5⊖	5		H	114	65	56	24	06		[illegible]				[illegible]
R	1757	E5⊖	5		H	111	63	56	25	07		[illegible]				[illegible]
R	[illegible]	B5⊖	5		H	116	62	57	27	06		[illegible]	502 16//			[illegible]
R	1957	E5⊕	5		H	118	62	58	25	06		[illegible]				LK
R	[illegible]	E5⊕	5		H	124	62	58	26	06		[illegible]				LH
R	2157	M6⊕	5		H	132	61	57	23	04		[illegible]	315 16// 69			[illegible]
R	[illegible]	E6⊕	5		H	124	60	57	24	03		[illegible]				[illegible]
R	[illegible]	E6⊕	5		F	136	60	[illegible]	[illegible]	04		995				[illegible]

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 21 JULY 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0055	29.710	61	59	90	10	10	St	E6	U				U				U			10	8	.010		
0158	29.705	61	59	90	10															10				
0255	29.695	61	59	90	10															10				
0355	29.690	61	59	90	10	10	St	M3	U				U				U			10	7	.020		
0455	29.695	61	59	90	10															10				
0555	29.705	61	59	90	10															10				
0655	29.710	62	60	90	10	10	St	E6	U				U				U			10	2	.020		
0758	29.725	62	60	90	10															10				
0855	29.735	63	61	87	10															10				
0958	29.735	64	61	84	10	10	St	B5	U				U				U			10	1	.025		
1058	29.740	67	61	73	10															10				
1158	29.730	68	62	70	10															10				
1258	29.725	69	62	68	10	10	St	B6	U				U				U			10	8	.010		
1357	29.715	69	62	68	10															10				
1452	29.715	68	62	70	10															10				
1557	29.700	68	62	70	10	10	St	B5	U				U				U			10	7	.025		
1657	29.690	65	60	73	10															10				
1757	29.680	63	59	78	10															10				
1857	29.695	62	59	84	10	10	St	B5	U				U				U			10	5	.005		
1957	29.700	62	60	87	10															10				
2057	29.720	62	60	87	10															10				
2157	29.740	61	59	90	10	10	St	M6	U				U				U			10	2	.045		
2255	29.745	60	59	93	10															10				
2310	29.750	60	59	[illegible]	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	61	61	X	X	X	X	X	X	X	X		
	0352	1	0	0	0	61	61		0								
	0952	2	0	0	0	64	61		0								
	1552	3	0	0	0	69	64		0								
	2152	4	0	0	0	68	61		0								
	MID	X	0	0	0	61	60	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSERVED BAR 61	1005.4	1006.9	1005.7	1007.1
TOTAL CORR. 62	0	0	0	.0
STA. PRESS. 63	1005.4	1006.9	1005.7	1007.1
BAROGRAPH 64	1006.0	1007.2	1006.0	1007.4
BAR. CORR. 65	-0.6	-0.3	-0.3	-0.3

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	60	0	0	0	11	23	1630					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			F	0340	0910
			H	0910	2330
			F	2330	[illegible]

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

MICROBAROGRAPH RESET 0955U

OPNAV FORM 3140-6 (REV. 6-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSSD SAN CLEMENTE ISLAND

DATE: 22 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (15)
R	0053	M5⊕	5		F	132	[illegible]	[illegible]	00	00		992	000 16//			AR
R	0158	E5⊕	5		F	134	60	57	24	02		993				AR
R	0258	E5⊕	5		F	132	60	59	24	02		992				AR
RS	0353	M3⊕	3	x	F	132	[illegible]	[illegible]	25	02		992	000 16// 60			DO
RS	0453	E3⊕	1	x	F	134	60	59	00	00		[illegible]				AR
R	0553	E5⊕	1	1	F	138	61	60	00	00		994				LH
R	0658	B4⊕	1	1	F	142	61	60	34	01		995	210 16//			LH
R	0758	E4⊕	1	1	F	146	63	61	00	00		997				LH
R	0858	E4⊕	1	1	F	146	64	61	00	00		996	1640 U 16			LH
RS	0958	B6⊕	1	1	F	141	65	61	34	01		996	103 16// 60 ⊕13			LH
RS	1058	E6⊕	1/2		HF	146	66	60	20	02		996				LH
R	1157	E6⊕	1/2		HF	146	65	60	23	02		996				LH
RS	1258	B4⊕	3/4		HF	141	67	60	30	04		995	805 16//			LH
RS	1358	E4⊕	1 1/2	1 1/2	HF	134	68	60	27	04		993				LH
RS	1457	E6⊕	4		H	128	67	59	31	05		991				LH
R	1553	B5⊕	4		H	124	63	58	35	03		990	715 16// 69			AR
R	1653	E5⊕	3	x	H	123	66	58	34	04		990				AR
R	1753	E5⊕	3	x	H	126	65	59	31	04		991				AR
R	1853	B5⊕	3	x	H	126	64	58	28	04		991	302 16//			AR
R	1953	E5⊕	3	x	H	132	63	58	29	04		992				AR
RS	2059	W2X	1/2	x	F	137	63	60	00	00		994				AR
R	2153	W2X	1/2	x	F	138	63	59	30	04		994	212 69			AR
R	2253	W2X	3/8	x	F	138	62	58	29	05		994				AR
R	2353	W2X	3/8	x	LF	138	61	58	26	05		994	L835			LH

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

GP 0067

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION UNSEO SAN CLEMENTE ISLAND DATE 22 JULY 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT 22	LOWEST LAYER TYPE & DIR 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.740	60	59	93	10	10	ST	M5	u	-	-		u				u			10	0	.003		
0158	29.745	60	59	93	10															10				
0258	29.740	60	59	93	10															10				
0358	29.740	60	50	93	10	10	ST	M3	u				u				u			10	0	.000		
0458	29.745	60	59	96	10															10				
0558	29.760	61	60	97	10															10				
0658	29.770	61	60	97	10	10	ST	B4	U				U				U			10	2	.030		
0758	29.780	63	62	93	10															10				
0858	29.780	64	62	90	10															10				
0958	29.780	65	62	87	10	10	ST	B6	U				U				U			10	1	.010		
1058	29.780	[illegible]	62	71	10															10				
1158	29.780	65	62	84	10															10				
1258	29.765	67	62	79	10	10	ST	B4	U				U				U			10	8	.015		
1358	29.745	67	63	76	10															10				
1458	29.730	67	63	70	10															10				
1558	29.720	68	62	70	10	10	ST	B5	u				u				u			10	7	.045		
1658	29.715	66	61	75	10															10				
1758	29.725	65	61	78	10															10				
1858	29.725	64	60	81	10	10	ST	B5	u				u				u			10	3	.005		
1958	29.740	63	60	84	10															10				
2058	29.755	63	61	90	10															10				
2158	29.760	63	61	87	10	10	F	W2	u				u				u			10	2	.035		
2258	29.760	62	60	87	10															10				
2358	29.760	61	59	90	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GROUND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_s H_s $M_sP_sD_s$ 54	WATER TEMP. 55	56	57	58
	MID TO 0352	X	0	0	X	60	60	X	X	X	X	X	X	X			
	0352	1	0	0	0	61	60		0								
	0952	2	0	.0	0	65	60		0								
	1552	3	0	0	0	[illegible]	[illegible]		0								
	2152	4	0	0	0	63	63		0								
	MID	X	T	0	0	63	[illegible]1	X	X	X	X	X	X	X			

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1007.0	1008.4	1006.4	1007.8
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1007.0	1008.4	1006.4	1007.8
BAROGRAPH 64	1006.6	1008.2	1006.2	1007.6
BAR. CORR. 65	+0.4	+0.2	+0.2	+0.2

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMELTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIREC-TION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
69	[illegible]	T	0	0	05	20	2358					10	10		

PRECIP. AND THDRSTM. 92	BEGAN 93	ENDED 94	OBSTR. TO VISION 96	BEGAN 97	ENDED 98
L-	2335	Cont	F	Cont	1015
			H	1015	1015
			F	1015	Cont

90. REMARKS, NOTES, AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-6 (REV. 8-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED San Clemente Island

DATE: 23 July 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	[illegible]	W2X	[illegible]	[illegible]	L-F	[illegible]	[illegible]	57	[illegible]	[illegible]		[illegible]	222 ~~16//~~			[illegible]
R	[illegible]	W2X	[illegible]	[illegible]	L-F	[illegible]	60	57	27	03		[illegible]				LH
R	[illegible]	W2X	[illegible]	—	L-F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]				LH
R	0358	W2X	3/8	*	L-F	126	[illegible]	57	00	00		971	2100060			LH
R	0458	W2X	3/8	*	L-F	[illegible]	[illegible]	57	25	03		[illegible]				LH
R	[illegible]	W2X	[illegible]	*	F	132	[illegible]	54	25	[illegible]		972	LE45			R[illegible]
R	[illegible]	W3X	3/4	3/4	F	137	60	[illegible]	00	00		[illegible]	~~203~~ ~~16//~~ 210			R[illegible]
S	[illegible]	W2X	1/2	1/2	F				25	[illegible]		974				R[illegible]
R	[illegible]	W2X	1/2	1/2	F	137	61	61	25	02		984				RK
R	[illegible]	W3X	3/4	3/4	L-F	[illegible]	62	[illegible]	25	02		977	LB40			RK
R	[illegible]	W3X	1	1	L-F	137	62	61	[illegible]	02		974	40000 ~~16//~~ 68			RK
R	1058	W4X	1	1	L-F	137	61	61	00	00		964				RK
RS	1158	W4X	2	2	L-F	134	[illegible]	[illegible]	24	02		962				R[illegible]
R	[illegible]	W4X	2	2	L-F	124	65	[illegible]	27	04		940	812 ~~16//~~			R[illegible]
R	[illegible]	W4X	7	7	F	11[illegible]	67	[illegible]	27	05		920	LE50			RK
RS	1158	[illegible]	7			114	[illegible]	[illegible]	2[illegible]	[illegible]		927				R[illegible]
R	[illegible]	[illegible]	7			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	71422 16// 62			R[illegible]
R	[illegible]	[illegible]	[illegible]		H	[illegible]	[illegible]	[illegible]	27	[illegible]		935				[illegible]
R	[illegible]	[illegible]	[illegible]		H	[illegible]	[illegible]	[illegible]	27	[illegible]		[illegible]				BB
R	1858	E5 ⊕	4		H	107	62	56	28	03		965	503 16//			BB
R	[illegible]	-X E5 ⊕	3	[illegible]	F	111	61	58	27	05		986	F4			BB
R	[illegible]	-X E5 ⊕	3	[illegible]	F	113	61	[illegible]	27	07		987	F4			BB
R	[illegible]	W2X	2	[illegible]	F	11[illegible]	[illegible]	[illegible]	28	[illegible]		980	143 69			N[illegible]
R	[illegible]	W3X	2	*	F	118	57	58	27	03		988				BB
R	[illegible]	W3X	2	*	F	121	59	57	24	23		989				BB

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

GP 3087

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSF San Clemente Island DATE 23 July 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT 22	LOWEST LAYER TYPE & DIR 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.755	60	59	93	10	10	F	W2	U				U				U			10	2	.005		
0158	29.745	60	59	93	10															10				
0258	29.735	[illegible]	[illegible]	[illegible]	10															10				
0358	29.725	60	59	96	10	10	F	W2	U				U				U			10	2	.030		
0458	29.735	60	59	93	10															10				
0558	[illegible]	[illegible]	[illegible]	96	10															10				
0658	29.755	[illegible]	[illegible]	96	10	10	F	W3	U				U				U			10	2	.035		
0758	29.755	61	61	100	10															10				
0858	29.755	62	61	97	10															10				
0958	29.755	62	61	97	10	10	F	W3	U				U				U			10	4	.000		
1058	29.755	[illegible]	62	90	10															10				
1158	29.745	64	61	87	10															10				
1258	29.721	65	61	81	10	10	F	W4	U				U				U			10	8	.035		
1358	29.705	67	62	[illegible]	10															10				
1458	29.690	[illegible]	63	70	10															10				
1558	29.680	68	62	73	10	10	[illegible]	[illegible]	U				U				U			10	7	.040		
1658	[illegible]	[illegible]	[illegible]	75	10															10				
1758	[illegible]	[illegible]	[illegible]	[illegible]	10															10				
1858	29.670	62	58	81	10	10	SE	F5	U				U				U			10	5	.010		
1958	29.680	61	59	90	10															10				
2058	29.685	61	[illegible]	79	10															10				
2158	29.685	[illegible]	57	[illegible]	10	10	F	[illegible]	U				U				U			10	1	.025		
2258	29.700	57	[illegible]	[illegible]	10															10				
2358	29.700	59	58	95	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF 54	WATER TEMP. 55	56	57	58
	MID TO	X	T	0	X	61	60	X	X	X	X	X	X	X			
	0352	1	T	0	0	63	60		2								
	0952	2	T	0	0	62	60		2								
	1552	3	T	0	0	59	62		[illegible]								
	2152	4	0	0	0	68	61		0								
	MID	X	0	0	0	61	59	X	X	X	X	X	X	X			

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	[illegible]	1007.6	[illegible]	1005.2
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	[illegible]	1007.6	1005.0	1005.2
BAROGRAPH 64	1006.4	1007.2	1005.0	[illegible]
BAR. CORR. 65	+0.2	+0.4	0	[illegible]

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
69	59	T	0	0	07	[illegible]	[illegible]					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
L-	Cont.	0545	F	Cont.	[illegible]
L-	0840	1350	H	1550	1930
			F	1930	Cont

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED — KNOTS | ASSOCIATED DIRECTION | TIME

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

* Tower [illegible]

OPNAV FORM 3140-8 (REV. 8-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED, SAN CLEMENTE ISLAND

DATE: 24 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer initials (14)
R	[illegible]	W 3 X	7	*	F	116	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	0C3			[illegible]
R	0153	W 4 V	7	*	F	[illegible]	[illegible]	[illegible]	2[illegible]	[illegible]		[illegible]				BK
R	0255	W 3 X	2	*	F	111	57	57	00	00		[illegible]				[illegible]
R	0355	W 4 Y	2	*	F	111	58	57	00	00		[illegible]	~~[illegible]~~ 65 59			BK
R	[illegible]	W 2 X	1	*	L–F	111	[illegible]	[illegible]	00	00		996	L3 40			BK
R	[illegible]	W 2 Y	1	*	L–F	116	[illegible]	58	20	03		[illegible]	~~[illegible]~~			BK
R	[illegible]	W 3 Y	1	*	L–F	113	[illegible]	[illegible]	21	03		[illegible]	3[illegible]			[illegible]
RS	[illegible]	W 4 Y	1½	*	L–F	[illegible]21	[illegible]	57	23	24		[illegible]				[illegible]
R	[illegible]	W 4 V	1½	*	L–F	123	[illegible]	[illegible]	22	02		[illegible]				[illegible]
R	[illegible]	W 4 Y	1	*	L–F	12[illegible]	[illegible]	60	23	02		001	2[illegible]301 59			[illegible]
[illegible]	[illegible]	–V F H [illegible]	[illegible]	*	F	126	[illegible]	[illegible]	20	00		001	LE 45			[illegible]
R	[illegible]	–Y F H [illegible]	1½	*	F	126	22	57	24	03		001	F4			[illegible]
RS	1255	–Y F [illegible]	3	*	F	[illegible]21	[illegible]	57	22	04		[illegible]	F2 805			[illegible]
R	[illegible]	E [illegible]	5		H	116	[illegible]	57	01	05		[illegible]	WND SHFT ~~[illegible]~~ 2140			[illegible]
R	1458	E 8 [illegible]	5		H	113	[illegible]	57	34	06		[illegible]				[illegible]
R	1558	E 8 [illegible]	5		H	111	66	57	33	04		[illegible]	[illegible]0016// 67			BK
R	1659	E 7 ⊕	4		H	107	66	[illegible]	30	06		965				BK
RS	[illegible]	E 6 [illegible]	3	*	H	111	64	57	30	[illegible]		[illegible]				BK
R	[illegible]	E 6 [illegible]	3	*	H	113	62	57	29	06		987	302 16//			BK
R	[illegible]	E 6 [illegible]	3	*	H	116	62	57	28	02		[illegible]				BK
R	2055	E 6 [illegible]	3	*	H	126	[illegible]	[illegible]	00	00		991				BK
R	2158	M 6 [illegible]	3	*	H	130	[illegible]	57	[illegible]	03		[illegible]	217 16// 67			BK
R	2259	E 6 [illegible]	3	*	H	13[illegible]	62	57	24	02		[illegible]				BK
R	[illegible]	E 6 [illegible]	3	*	H	123	[illegible]	57	20	00		991				[illegible]

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-65)
0107-731-1001

87

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

NWAF 10B

STATION NAVSED SAN CLEMENTE ISLAND DATE 24 JULY 71

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT. 22	TYPE & DIR. 23	HEIGHT 24	SECOND LAYER AMT. 25	TYPE & DIR. 26	HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT 29	TYPE & DIR. 30	HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	TYPE & DIR. 34	HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0055	[illegible]	59	58	96	10	10	F	W3	U				U				U			10	0	.010		
0152	29.690	59	58	93	10															10				
0255	29.680	59	58	93	10															10				
0352	29.680	59	68	93	10	10	F	W3	U				U				U			10	6	.010		
0453	29.680	59	58	96	10															10				
0552	29.695	59	58	96	10															10				
0652	29.700	60	59	96	10	10	F	W3	U				U				U			10	3	.020		
0752	29.710	60	59	96	10															10				
0852	29.715	61	60	93	10															10				
0952	29.725	61	60	93	10	10	F	W4	U				U				U			10	2	.025		
1052	29.725	61	60	93	10															10				
1152	29.725	62	60	93	10															10				
1252	29.710	64	61	84	10	2	F	—	8	Sc	E6	10	U				U			10	8	.015		
1352	29.695	66	60	73	10															10				
1452	29.685	67	61	70	10															10				
1552	29.680	66	60	73	10	10	St	E8	U				U				U			10	7	.030		
1652	29.670	66	61	75	10															10				
1752	29.681	64	60	78	10															10				
1852	29.685	62	58	81	10	10	St	E6	U				U				U			10	3	.005		
1952	29.695	62	59	84	10															10				
2052	29.725	64	60	81	10															10				
2152	29.735	63	59	[illegible]	10	10	St	M6	U				U				U			10	2	.050		
2255	29.735	62	59	[illegible]	10															10				
2359	29.721	62	59	[illegible]	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S V_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	59	59	X	X	X	X	X	X	X	X		
	0352	1	0	0	0	61	59		0								
	0952	2	.01	0	0	61	59		1								
	1552	3	T	0	0	67	61		0								
	2152	4	0	0	0	66	62		0								
	MID	X	0	0	0	67	62	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0952	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	1005.0	[illegible]	1005.1	[illegible]
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1005.0	1006.6	1005.1	1006.2
BAROGRAPH 64	1004.4	[illegible]	1004.6	1006.2
BAR. CORR. 65	+0.6	+0.	+0.5	+0.6

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	DIRECTION 72	TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	MIDNIGHT TO MIDNIGHT 79	80	81
67	59	.01	0	0	8	30	1758					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
L--	0420	0510	F	Cont	1350
L-	0510	1045	H	1350	Cont

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-2 (REV. 8-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMENTE ISLAND

DATE: 25 July 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	[illegible]	[illegible]	3	[illegible]	H	121	[illegible]	57	23	[illegible]		[illegible]	808 16//			[illegible]
R	[illegible]	[illegible]	3	[illegible]	H	124	61	57	00	00		[illegible]				[illegible]
R	[illegible]	E6 [illegible]	3	[illegible]	H	124	61	57	23	03		[illegible]				[illegible]
R	[illegible]	[illegible]	3	[illegible]	H	[illegible]	61	[illegible]	20	[illegible]		[illegible]	103 16// 61			[illegible]
R	[illegible]	[illegible]	3	[illegible]	H	124	[illegible]	[illegible]	27	[illegible]		[illegible]				[illegible]
R	[illegible]	[illegible]	4		H	130	61	58	25	03		[illegible]				[illegible]
R	0658	E1 ⊕	4		H	132	61	58	00	00		992	207 16//			[illegible]
R	0758	E1 ⊕	4		H	132	61	58	23	02		992				FK
R	0858	E6 ⊕	4		H	132	63	59	28	02		99[illegible]				BK
R	0958	E6 ⊕	4		H	134	61	58	27	03		993	302 16// 61			BK
R	1058	E6 ⊕	4		H	136	65	58	30	02		993				[illegible]
R	1158	E6 ⊕	4		H	134	66	58	22	02		99[illegible]				[illegible]
R	1258	E7 ⊕	4		H	132	67	57	24	04		992	802 16//			BK
R	1358	A10 ⊕	4		H	126	67	56	25	05		991				BK
RS	1458	A11 ⊕	5		H	124	68	56	27	08		990	615			BK
R	1558	E11 ⊕	4		H	121	67	56	27	08		989	710 15// 68			[illegible]
R	1658	E11 ⊕	5		H	114	66	56	27	06		987				[illegible]
R	1758	E11 ⊕	5		H	114	65	56	31	06		987				[illegible]
R	1858	E11 ⊕	5		H	[illegible]	63	56	30	05		[illegible]	500 15// SLP 121 ALT 989			[illegible]
R	1958	E10 ⊕	5		H	124	63	57	29	06		990				EB
R	2058	E10 ⊕	5		H	132	63	57	27	02		992				RA
R	2158	E10 ⊕	5		H	132	62	57	30	03		[illegible]	110 15// 68			[illegible]
R	2258	E10 ⊕	5		H	132	62	56	28	04		992				[illegible]
R	2358	E10 ⊕	5		H	132	60	56	27	06		992				BK

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-66)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 26 JULY 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HU-MID-ITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.730	60	58	87	10	10	St	E6	U				U				U			10	8	.010		
0158	29.725	60	58	87	10															10				
0258	29.725	60	58	87	10															10				
0358	29.725	60	58	87	10	10	St	M4	U				U				U			10	6	.005		
0458	29.740	59	57	90	10															10				
0558	29.750	59	57	90	10															10				
0658	29.760	57	57	90	10	10	St	E4	U				U				U			10	2	.035		
0758	29.770	60	58	90	10															10				
0858	29.775	61	59	87	10															10				
0958	29.780	62	59	84	10	10	St	B6	U				U				U			10	2	.020		
1058	29.780	64	60	78	10															10				
1158	29.775	65	60	75	10															10				
1258	29.760	66	60	70	10	10	St	E6	U				U				U			10	8	.020		
1358	29.735	66	59	68	10															10				
1458	29.720	64	59	75	10															10				
1558	29.710	64	59	73	10	0	H	–	10	St	67	10	u				u			10	7	.050		
1658	29.710	62	58	78	10															10				
1758	29.710	61	57	81	10															10				
1858	29.705	60	57	84	10	10	St	67	0			10	0			10	0			9	2	.005		
1958	29.715	60	58	87	10															10				
2058	29.750	60	58	87	10															10				
2158	29.720	59	57	93	10	10	St	M5	u				u				u			10	1	.025		
2258	29.735	59	58*	93	10															10				
2358	29.735	59	58	93	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		60	60										
	0352	1	0	0	0	62	60		0								
	0952	2	0	0	0	62	59		0								
	1552	3	0	0	0	66	62		0								
	2152	4	0	0	0	64	59		0								
–	MID		0	0	0	59	59										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	1006.6	1007.4	1006.0	1006.3
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1006.6	1007.4	1006.0	1006.3
BAROGRAPH 64	1006.2	1007.6	1006.2	1006.3
BAR. CORR. 65	+0.4	-0.2	-0.2	0

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIREC-TION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUN-RISE TO SUNSET 78	SKY COVER MID-NIGHT TO MID-NIGHT 79	80	81
66	59	0	0	0	12	32	1457					10	10		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT.	1530

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNO'S		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-8 (REV. 8-61)

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NAVSFD ~~SAN~~ CLEMENTE ISLAND

DATE: 26 JULY 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	E6⊕	5		H	124	60	56	25	06		991	503 16//			BK
R	0158	E6⊕	5		H	126	60	56	27	07		991				BK
R	0258	E6⊕	5		H	126	60	56	26	06		991				BK
RS	0356	M4⊕	4		H	126	60	56	30	05		991	602 16// 60			BK
R	0458	E4⊕	4		H	132	60	56	29	04		[illegible]				BK
R	0558	E4⊕	3	4	H	136	[illegible]	[illegible]	29	05		[illegible]				RS
R	0658	E4⊕	3	3	H	138	59	56	30	04		994	212 16//			LH
RS	0758	E5⊕	3	3	H	142	60	57	27	06		995				LH
R	0858	E5⊕	3	3	H	143	61	57	31	04		996				LH
R	0958	B6⊕	3	3	H	146	62	57	29	06		996	207 16// 59			LH
R	1058	E6⊕	3	3	H	146	64	57	31	06		996				LH
R	1158	E6⊕	4		H	143	65	57	27	04		996				LH
R	1258	E6⊕	4		H	138	66	56	26	06		994	807 16//			LH
R	1358	A8⊕	4		H	130	66	55	27	08		992	⊕20			BG
R	1458	E6⊕	4		H	124	64	56	30	12		990				LH
R	1558	B7⊕	7			121	64	55	31	12		989	H ALOFT 717 16// 66			[illegible]
R	1658	E7⊕	7			121	62	55	29	06		989	H ALOFT			[illegible]
R	1758	E7⊕	7			121	61	55	29	06		989				AK
R	1858	B7⊕	7			119	60	55	28	09		989	GINOVC OVHD 802 1600			AK
R	1958	E7⊕	7			123	60	56	28	06		990				AK
R	2058	E7⊕	7			128	60	56	27	08		991				AK
R	2158	M5⊕	7			128	58	56	27	08		991	108 16// 66			AK
R	2258	E5⊕	7			130	59	57	27	06		992				AK
R	2358	E5⊕	7			130	59	57	29	10		992				LH

A synoptic observation, in WMO code format FM11A, is entered on line following related aviation observation.

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

NWSED 108

STATION NWSED SAN CLEMENTE ISLAND DATE 25 JULY 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.710	62	59	84	10	10	St	E6	U				U				U			10	8	.125		
0158	29.720	61	59	87	10															10				
0258	29.720	61	[illegible]	87	10															10				
0358	29.720	61	59	87	10	10	St	E6	U				U				U			10	1	.010		
0458	29.725	61	59	87	10															10				
0558	29.725	61	59	[illegible]	10															10				
0658	29.740	61	59	90	10	10	St	E6	U				U				U			10	2	.020		
0758	29.740	61	59	90	10															10				
0858	29.740	63	61	81	10															10				
0958	29.745	64	60	81	10	10	St	E6	U				U				U			10	3	.005		
1058	29.750	65	61	78	10															10				
1158	29.745	68	62	70	10															10				
1258	29.740	67	61	70	10	10	St	E7	U				U				U			10	8	.105		
1358	29.725	67	60	68	10															10				
1458	29.720	68	61	65	10															10				
1558	29.710	67	60	68	10	10	Sc	E11	U				U				U			10	7	.030		
1658	29.710	66	60	70	10															10				
1758	29.710	65	60	73	10															10				
1858	29.710	65	60	73	10	10	Sc	E11	U				U				U			10	5	.000		
1958	29.720	63	59	81	10															10				
2058	29.740	63	59	81	10															10				
2158	29.740	62	59	84	10	10	Sc	E11	U				U				U			10	1	.030		
2258	29.740	62	58	81	10															10				
2358	29.740	60	58	86	10															10				

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_9 $H_SP_SD_S$ 54	WATER TEMP. 55	56	57	58
	MID-76	X	0	0	X	62	61	X	X	X	X	X	X	X	X		
	0352	1	0	0	0	63	61		0								
	0952	2	0	0	0	64	61		0								
	1552	3	0	0	0	68	64		0								
	2152	4	0	0	0	67	62		0								
	MID	X	0	0	0	62	60	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0352	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	1006.4	1007.3	1006.1	1002.0
TOTAL CORR. 62	0	0	0	0
STA. PRESS. 63	1006.4	1007.3	1006.1	1002.0
BAROGRAPH 64	1006.2	1006.6	1006.2	1006.8
BAR. CORR. 65	[illegible]	+0.7	[illegible]	+0.2

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
68	60	0	0	0	08	~~44~~ 27	1558					10	10		

PRECIP. AND THORSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED KNOTS | ASSOCIATED DIRECTION | TIME

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

SURFACE WEATHER OBSERVATIONS

3-16 November 1971

OPNAV FORM 3140-7 (4-65)
0107-711-1001.

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED San Clemente Island DATE 03 November 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.940	53	52	93	5	5	-X	—	0			5	0			5	0			5	8	.025		
0158	29.925	49	48	96	0															0				
0258	29.910	56	53	80	0															0				
0358	29.915	54	52	86	0	0			0			0	0			0	0			0	5	.025		
0458	29.915	56	54	86	0															0				
0558	29.930	56	54	86	0															0				
0658	29.935	53	51	89	0	0	Cl	250	0			0	0			0	0			0	1	.020		
0758	29.945	62	60	87	0															0				
0858	29.950	64	57	75	0															0				
0958	29.950	65	58	68	2	2	Cl	250	0			2	0			2	0			1	1	.015		
1058	29.940	70	62	66	1															1				
1158	29.910	72	57	39	1															1				
1258	29.885	74	57	32	3	3	Cl	250	0			3	0			3	0			2	7	.065		
1358	29.870	72	58	43	3															1				
1458	29.855	71	55	32	3															2				
1558	29.850	71	54	29	3	3	Cl	250	0			3	0			3	0			2	7	.025		
1658	29.855	68	53	36	2															2				
1758	29.865	63	51	41	2															2				
1858	29.875	62	53	56	2	2	Cl	250	0			2	0			2	0			2	2	.015		
1958	29.875	60	54	67	4															2				
2058	29.870	61	53	60	5															2				
2158	29.865	63	62	44	5	5	Cl	250	0			5	0			5	0			2	8	.010		
2258	29.860	60	53	62	3															1				
2358	29.845	60	50	47	2															1				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-6 (REV. 8-61)

NWS FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SW Chewrik Island

DATE: 03 November 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	[illegible]	—X	0		GF	200	53	51	19	04		012	808			[illegible]
R	[illegible]	0	5		H	194	17	44	00	00		011				[illegible]
R	0258	0	5		H	189	56	50	00	00		009				[illegible]
R	0358	0	5		!!	191	54	50	00	00		010	508 49			[illegible]
R	[illegible]	0	3		GF	191	56	52	00	00		010				[illegible]
R	0558	0	3		H	196	56	52	00	00		011				[illegible]
R	0658	0	10			195	53	50	19	02		012	DSNT CI S / 107 1001			AR
R	0758	0	10			202	62	58	00	00		013	RH LYR SRNDNG TS / FEW CI S			AR
R	0859	0	15			203	64	55	22	03		013	FEW CI S			DD
R	0958	250-⦶	15			203	65	54	24	02		013	105 49			DB
R	1058	250-⦶	15			200	70	58	29	02		012				DB
R	1158	250-⦶	15			189	72	46	36	05		009				DB
R	1258	250-⦶	15			191	74	42	27	03		007	WND SHFT 722 1001			DB
R	1358	250-⦶	15			176	72	48	26	03		005				DB
R	1458	250 ⦶	25			174	71	40	27	04		005				DB
R	1558	250 ⦶	25			172	71	37	25	04		004	708 1001 74			DB
R	1658	250 ⦶	25			171	68	40	22	04		004				DB
R	1758	250 ⦶	25			174	63	39	23	04		005	WND LGT VRBL			BK
R	1858	250 ⦶	25			177	62	46	24	03		006	WND LGT VRBL 205			BK
R	1958	250-⦶	25			177	60	49	00	00		006				BK
R	2058	250-⦶	25			176	61	47	26	03		005	WND LGT VRBL			BK
R	2158	250-⦶	25			174	63	41	30	04		005	WND LGT VRBL 803 1001 74			BK
R	2258	250-⦶	25			172	60	47	23	04		004	WND LGT VRBL			BK
R	2358	250-⦶	25			167	60	40	00	00		003				BK

3 NOV

(GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	FALL (Ins) 45	DEPTH (Ins) 46	TEMP. (°F) 47	TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $H_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0													
	[illegible]0	1	[illegible]	[illegible]	0	57	47		0								
	0950	2	0	0	0	65	53		0								
	1550	3	0	0	0	74	65		0								
	2150	4	0	0	0	71	60		0								
	MID		0	0	0	63	60										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	[illegible]	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	[illegible]	1013.8	1010.8	1011.0
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1012.9	1014.1	1011.3	1011.3
BAROGRAPH 64	[illegible]	1013.8	1010.8	1010.8
BAR. CORR. 65	[illegible]	+0.3	+0.3	+0.5

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMELTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
72	57	0.	0	0	05	31	1158					0	1		

PRECIP. AND THORSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			GF	Cont	0130
			H	0130	0640
			GF	0440	0510
			H	0510	0620

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 04 NOVEMBER 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.835	63	52	46	2	2	Cl	250	0			2	0			2	0			1	7	.050		
0158	29.825	60	53	64	2															1				
0258	29.820	58	52	69	2															1				
0358	29.820	56	62	74	2	2	Cl	250	0			2	0			2	0			1	6	.015		
0458	29.815	52	49	83	2															1				
0563	29.815	53	50	83	4															3				
0658	29.820	58	56	90	7	7	Cl	250	0			7	0			7	0			3	5	.000		
0758	29.830	65	58	68	7															3				
0858	29.825	66	58	63	7															5				
0958	29.825	67	59	61	8	8	Cl	[illegible]	0			8	0			8	0			6	1	.005		
1058	29.820	69	58	53	8															6				
1158	29.805	67	58	57	8															6				
1258	29.775	68	58	54	8	8	Cl	200	0		1	8	0			8	0			7	7	.050		
1358	29.750	68	58	53	7															6				
1458	29.745	69	55	34	8															5				
1558	29.735	64	57	63	9	9	Cl	200	0			9	0			9	0			3	7	.040		
1658	29.740	60	54	67	8															3				
1758	29.745	58	54	77	5															2				
1858	29.745	58	55	80	5	2	Ac	180	3	Cl	200	5	0			5	0			2	1	.010		
1958	29.745	56	54	86	4															2				
2058	29.750	58	56	87	3															1				
2158	29.760	57	55	86	3	2	Ac	180	1	Cl	250	3	0			3	0			1	3	.015		
2258	29.755	56	54	90	7															3				
2358	29.745	66	54	90	10															5				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-6 (REV. 8-61) NWAR FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: UWSED SAN CLEMENTE ISLAND

DATE: 04 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer initials (14)
R	0058	250-⊕	25			164	63	42	30	03		202	WND LGT VRBL 710 1001			BK
R	0158	250-⊕	25			161	60	48	21	02		201				BK
R	0258	250⊕	25			159	58	48	22	02		200				BK
R	0358	250-⊕	25			159	56	48	00	00		200	605 1001 56			BK
R	0458	250-⊕	25			158	52	47	00	00		200				BK
R	0558	180⊕ 250-⊕	25			158	52	48	17	04		200				BK
R	0658	250-⊕	25			151	58	55	19	04		202	KH LYR SRNDNG IS 500 1001			BK
R	0758	250-⊕	15			[illegible]	65	54	00	00		221				NB
R	0858	E200⊕	15			161	66	53	22	03		201				NB
R	0958	E200⊕	15			161	67	53	27	02		201	102 1001 59			NB
R	1058	E200⊕	15			159	[illegible]	51	30	03		200				NB
R	1158	E200⊕	15			154	67	52	36	05		999				NB
R	1258	E200⊕	15			145	68	51	35	04		[illegible]	717 1002			NB
R	1358	E200⊕	15			136	[illegible]	[illegible]	35	04		993				NB
R	1458	E200⊕	15+			134	69	43	30	04		993				NB
R	1558	200-⊕	15			130	64	51	24	05		992	714 1001 69			AR
R	1658	180⊕ 200-⊕	15+			132	60	49	24	04		992	CC SW-W			AR
R	1758	180⊕ 200-⊕	25			134	58	51	21	04		993				BK
R	1858	180⊕ 200-⊕	25			134	58	52	23	04		993	103 1071			BK
R	1958	180⊕ 200-⊕	25			134	56	52	24	04		993				BK
R	2058	180⊕ 200-⊕	10			136	58	54	20	04		993	H ALQDS			BK
R	2158	180⊕ 250-⊕	10			138	57	53	22	04		994	H ALQDS 305 1071 69			BK
R	2258	250-⊕	10			137	56	53	20	05		994	H ALQDS			BK
FS	2358	6-⊕	4		F	134	56	53	21	06		993	F INCRG			BK

4 NOV

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	63	56	X	X	X	X	X	X	X	X		
	0350	1	0	0	0	63	56		0								
	0950	2	0	0	0	67	52		0								
	1552	3	0	0	0	69	69		0								
	2150	4	0	0	0	64	56		1								
	MID	X	0	0	0	57	56	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR. 61	1009.9	1009.7	1006.2	1007.5
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1009.7	1010.0	1006.5	1007.8
BAROGRAPH 64	1009.0	1009.8	1006.6	1007.2
BAR. CORR. 65	+0.7	+0.2	+0.3	+0.6

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
69	52	0	0	0	09	22	2130					3	5		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			F	1130	

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 5 NOVEMBER 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HU-MID-ITY (%) 20	TOTAL SKY COVER 21	Lowest Layer AMT. 22	Lowest Layer TYPE & DIR. 23	Lowest Layer HEIGHT 24	Second Layer AMT. 25	Second Layer TYPE & DIR. 26	Second Layer HEIGHT 27	SUM-MA-TION TOTAL 28	Third Layer AMT. 29	Third Layer TYPE & DIR. 30	Third Layer HEIGHT 31	SUM-MA-TION TOTAL 32	Fourth Layer AMT. 33	Fourth Layer TYPE & DIR. 34	Fourth Layer HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.735	56	55	93	10	10	ST	6	0			10	0			10	0			5	7	.025		
0158	29.735	56	55	93	10															4				
0258	29.720	56	55	93	10															4				
0358	29.730	57	56	93	10	10	ST	M4	U				U				U			10	6	.005		
0458	29.730	56	54	90	10															10				
0558	29.720	56	54	90	10															10				
0658	29.735	55	53	90	10	10	ST	67	0			10	0			10	0			13	3	.005		
0758	29.745	56	54	90	7															5				
0858	29.755	56	54	86	9															8				
0958	29.770	57	54	80	9	9	ST	E7	0			9	0			9	0			9	2	.035		
1058	29.750	58	55	80	6															6				
1158	29.740	60	53	72	8															8				
1258	29.710	59	54	72	8	1	ST	10	7	AC	E120	8	0			8	0			8	7	.060		
1358	29.710	57	54	72	8															8				
1458	29.705	59	54	72	8															8				
1558	29.705	58	53	75	10	7	ST	E10	10	AC	150	10	U				U			10	6	.005		
1658	29.710	57	53	75	10															10				
1758	29.725	57	53	77	10															10				
1858	29.735	57	53	77	10	10	ST	E9	U				U				U			10	2	.030		
1958	29.750	56	53	80	3															3				
2058	29.750	52	50	86	4															4				
2158	29.760	56	54	86	7	7	ST	E9	0			7	0			7	0			6	2	.025		
2258	29.765	56	53	83	10															10				
2358	29.765	56	53	83	10															10				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-6 (REV. 8-61) NWSR FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION NWSED SAN CLEMENTE ISLAND

DATE 5 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts.) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
L	2058	6 -⊕	4		F	130	56	54	24	03		992	708 1600			BK
S	0118	4 -⊕	4		F				23	04		992	BINOVC			BK
R	0158	4 -⊕	4		F	130	56	54	21	03		992	BINOVC			BK
R	0258	4 -⊕	4		F	128	56	54	24	02		991	BINOVC			BK
R	0358	H 4 ⊕	4		F	128	57	55	25	03		991	MOON DMLY VSBL 602 16// 52			BK
R	0458	E4⊕	4		F	128	56	53	26	05		991				BK
RS	0558	E6⊕	5		H	124	56	53	24	02		990				BK
R	0658	B7⊕	5		H	130	55	52	23	04		992	BINOVC E / 302 16//			AR
R	0758	E7⦶ 150 ⦶	5		H	134	56	53	19	04		993				AR
R	0858	E7⦶ 150 ⦶	6		H	137	56	52	20	03		999				AR
R	0958	E7⦶	5		H	142	57	51	23	05		995	212 1600 52			LA
R	1058	E10⦶	5		H	136	58	52	24	06		993				LA
R	1158	10⦶ E120⦶	5		H	131	60	57	24	06		992				LA
R	1258	10⦶ E120⦶	5		H	121	59	50	23	05		989	720 1650			LA
R	1358	10⦶ E120⦶	5		H	121	57	50	23	06		989				LA
R	1458	10⦶ E120⦶	5		H	119	59	50	20	07		989				LA
R	1558	E10⦶ 150⊕	5		H	119	58	50	20	05		989	VSBY NE 2 602 165/ 60			BK
R	1658	E10⦶ 150⊕	5		H	121	57	49	24	04		989	VSBY NE 2 WND LGT VRBL			BK
RS	1758	M9⊕	6		H	126	57	50	21	04		991	VSBY NE 2 BINOVC W WND LGT VRBL			BK
R	1858	E9⊕	5		H	130	57	50	19	05		992	WND LGT VRBL 210 16//			BK
R	1958	9⦶	5		H	136	56	50	20	02		993				LA
R	2058	9⦶	5		H	136	52	48	15	04		993				LA
R	2158	E9⦶	5		H	138	56	52	19	02		994	208 1600 60			BK
R	2258	E9⊕	5		H	141	56	51	18	02		995				BK
R	2358	E9⊕	5		H	141	56	51	09	04		995	THN SPTS IOVC			BK

viation observation.

5 NOV

TIME (GMT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		57	56										
	0350	1	0	0	0	57	56		1								
	0950	2	0	0	0	57	55		0								
	1550	3	0	0	0	60	57		0								
	2150	4	0	0	0	58	52		0								
	MID		0	0	0	56	56										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1006.4	1007.7	1005.5	1007.5
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1006.7	1008.0	1005.8	1007.8
BAROGRAPH 64	1006.0	1007.7	1005.6	1007.0
BAR. CORR. 65	+0.7	+0.3	+0.2	+0.8

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
60	52	0	0	0	08	13	2315					7	8		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			F	CONT	0520
			H	0520	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 6 NOVEMBER 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.765	56	53	80	10	10	ST	M12	U				U				U			10	1	.005		
0158	29.770	55	52	80	7															6				
0258	29.770	56	53	80	7															6				
0358	29.725	56	53	80	10	10	ST	E12	U				U				U			10	2	.010		
0458	29.790	56	53	80	10															10				
0558	29.805	55	52	80	10															10				
0658	29.805	52	50	89	0	0			0				0				0			0	1	.030		
0758	29.840	58	55	83	1															1				
0858	29.845	60	54	69	1															1				
0958	29.850	60	53	64	5	5	SC	10	0			5	0			5	0			5	2	.045		
1058	29.845	62	54	60	1															1				
1158	29.830	63	55	[illegible]	0															0				
1258	29.820	63	55	58	1	1	Sc	10	0			1	0			1	0			1	7	.030		
1358	29.810	62	54	60	0															0				
1458	29.810	61	54	62	1															1				
1558	29.810	60	53	64	6	6	Sc	E15	0			6	0			6	0			6	6	.010		
1658	29.810	58	52	64	6															6				
1758	29.[illegible]35	56	51	72	6															6				
1858	29.840	55	50	72	6	6	ST	E15	0			6	0			6	0			6	3	.030		
1958	29.850	57	54	80	6															6				
2058	29.855	56	5[illegible]	80	2															1				
2158	29.870	56	54	86	6	6	ST	E15	0			6	0			6	0			6	2	.030		
2258	29.865	56	53	83	8															7				
2356	29.860	56	53	80	10															10				

SYNOPTIC OBSERVATIONS

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OPNAV FORM 3140-6 (REV. 8-61)

NSAR FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMENTE ISLAND

DATE: 6 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	Observer's initials (14)
RS	0059	M12 ⊕	5		H	141	56	50	09	02		995	BINOVC OVHD 102 16//	BK
R	0158	E12 ⦶	5		H	142	55	49	07	02		995		BK
R	0258	E12 ⦶	5		H	142	56	50	00	00		995		BK
R	0358	E12 ⊕	5		H	143	56	50	00	00		996	203 16// 52	BK
R	0459	E12 ⊕	5		H	149	56	50	00	00		997	BINOVC OVHD	BK
R	0558	E12 ⊕	5		H	154	55	49	00	00		999	THN SPTS INVOIC	BK
R	0658	O	5		H	154	58	49	12	02		999	DSNT ST W 110	LH
R	0758	10 ⦶	5		H	166	58	53	00	00		002		LH
R	0858	10 ⦶	5		H	167	60	50	02	03		003		LH
R	0958	10 ⦶	5		H	169	60	48	05	06		003	215 1500 52	LH
R	1058	10 ⦶	5		H	167	62	48	11	05		003		LH
R	1158	O	5		H	162	63	48	09	08		001		LH
R	1258	10 ⦶	5		H	159	63	48	24	08		000	710 1500	LH
R	1358	O	5		H	156	62	48	25	05		999		LH
R	1458	15 ⦶	7			156	61	48	27	04		999		LH
RS	1558	E15 ⦶	7			156	60	48	28	06		999	603 1500 63	LH
R	1658	E15 ⦶	7			156	58	46	29	04		999		LH
R	1758	E15 ⦶	7			161	56	47	30	02		001		RK
R	1858	E15 ⦶	7			166	55	46	00	00		003	310 1600	BK
R	1958	E15 ⦶	7			169	57	51	00	00		003		BK
R	2058	15 ⦶	7			171	56	50	00	00		004		RK
R	2158	E15 ⦶	7			176	56	52	00	00		005	210 1600 63	BK
R	2258	E15 ⦶	7			174	56	51	00	00		004		BK
R	2358	M11 ⊕	5		H	172	56	50	00	00		004	THN SPTS INVOIC	BK

...ion observation.

6 NOV

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_s H_s $M_sP_sD_s$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		56	55										
	0350	1	0	0	0	56	55		0								
	0950	2	0	0	0	60	52		0								
	1550	3	0	0	0	63	60		0								
	2150	4	0	0	0	60	55		0								
	MID		0	0	0	56	56										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1007.9	1010.4	1009.1	1011.1
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1008.2	1010.7	1009.4	1011.4
BAROGRAPH 64	1007.6	1010.7	1009.1	1011.0
BAR. CORR. 65	+0.6	0	+0.3	+0.4

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	52	0	0	0	10	24	1235					2	5		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT.	1435
			H	2330	CONT.

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION UWSED SAN CLEMENTE ISLAND DATE 7 NOVEMBER 1971

TIME (LST)	STATION PRES-SURE (Ins)	DRY BULB (°F)	WET BULB (°F)	REL. HU-MID-ITY (%)	TOTAL SKY COVER	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT.	LOWEST LAYER TYPE & DIR.	LOWEST LAYER HEIGHT	SECOND LAYER AMT.	SECOND LAYER TYPE & DIR.	SECOND LAYER HEIGHT	SUM-MA-TION TOTAL	THIRD LAYER AMT.	THIRD LAYER TYPE & DIR.	THIRD LAYER HEIGHT	SUM-MA-TION TOTAL	FOURTH LAYER AMT.	FOURTH LAYER TYPE & DIR.	FOURTH LAYER HEIGHT	TOTAL OPAQUE SKY COVER	PRESSURE TENDENCY	NET 3-HR CHANGE		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0058	29.855	56	53	80	10	10	ST	E11	U				U				U			10	7	.015		
0158	29.855	55	52	80	10															10				
0258	29.850	55	52	83	10															10				
0358	29.8[illegible]	55	52	83	10	10	ST	F11	U				U				U			10	7	.005		
0458	29.860	55	52	80	10															10				
0558	29.865	55	52	80	10															10				
0658	29.870	55	52	83	10	10	ST	E11	U				U				U			10	2	.020		
0758	29.910	56	53	80	10															10				
0858	29.910	56	53	80	10															10				
0958	29.910	56	53	80	10	10	ST	E11	U				U				U			10	1	.040		
1058	29.905	58	52	69	10															10				
1157	29.890	58	52	67	10															10				
1258	29.870	57	51	67	10	10	ST	E15	U				U				U			10	7	.040		
1358	29.850	56	51	69	10															10				
1458	29.845	56	51	72	9															9				
1558	29.845	55	50	72	10	10	ST	E15	U				U				U			10	6	.025		
1658	29.850	55	51	74	10															10				
1758	29.850	55	52	80	10															10				
1858	29.850	55	52	60	10	10	ST	M10	U				U				U			10	1	.005		
1958	29.865	55	52	83	10															10				
2058	29.870	55	52	80	10															10				
2158	29.895	55	52	83	10	10	ST	M10	U				U				U			10	1	.025		
2258	29.870	55	52	83	10															10				
2358	29.860	54	51	83	10															10				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-6 (REV. 8-61) WBAN FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMENTE ISLAND

DATE: 7 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	E11⊕	5		H	171	56	50	34	04		004	705 16//			BK
R	0158	E11⊕	5		H	171	55	49	30	03		004	BINOVC OVHD			BK
R	0258	F11⊕	5		H	169	55	50	30	03		005				BK
R	0358	E11⊕	5		H	169	55	50	33	05		003	702 16// 55			BK
R	0458	E11⊕	5		H	172	55	49	31	04		004				BK
R	0558	E11⊕	5		H	174	55	49	00	00		005				BK
R	0658	E11⊕	5		H	176	55	50	36	02		005	207 16//			LH
R	0758	E11⊕	5		H	189	56	50	28	02		009				LH
R	0858	E11⊕	3		H	189	56	50	26	04		009				LH
R	0958	E11⊕	3		H	189	56	50	27	03		004	114 16// 55			LH
R	1058	B15⊕	3		H	188	58	48	23	05		009				LH
R	1158	E15⊕	3		H	182	58	48	23	03		007				LH
R	1258	E15⊕	5		H	176	57	46	27	06		005	714 16//			LH
R	1358	E15⊕	5		H	169	56	46	29	06		003				LH
R	1458	E15⊕	5		H	167	56	47	29	04		003				LH
R	1558	E15⊕	5		H	167	55	46	27	06		003	608 16// 58			LH
R	1658	E15⊕	5		H	169	55	47	28	04		003				LH
R	1758	E15⊕	5		H	169	55	49	29	05		003				BK
R	1858	M10⊕	5		H	169	55	49	25	03		005	102 16//			BK
R	1958	E10⊕	5		H	174	55	[illegible]	30	05		005	WND LGT VRBL			BK
R	2058	E10⊕	5		H	176	55	49	32	02		005				BK
R	2158	M10⊕	5		H	177	55	50	21	04		006	WND LGT VRBL ICB 16// 5?			BK
R	2258	E10⊕	5		H	176	55	50	29	03		005	WND LGT VRBL			BK
R	2358	E10⊕	5		H	17?	54	49	31	02		004				BK

ation observation.

7 NOV

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_SP_SD_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		56	55										
	0350	1	0	0	0	56	56		0								
	0950	2	0	0	0	56	55		0								
	1550	3	0	0	0	58	55		0								
	2150	4	0	0	0	55	55		0								
	MID		0	0	0	55	54										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1010.3	1012.5	1010.3	1011.4
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1010.6	1012.8	1010.6	1011.7
BAROGRAPH 64	1010.2	1012.2	1010.6	1011.2
BAR. CORR. 65	+0.6	+0.6	0	+0.5

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMELTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
[illegible]	54	0	0	0	11	78	1610					9	9		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT.	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 8 NOVEMBER 1971

TIME (LST)	STATION PRES-SURE (Ins)	DRY BULB (°F)	WET BULB (°F)	REL. HU-MID-ITY (%)	TOTAL SKY COVER	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT.	LOWEST LAYER TYPE & DIR.	LOWEST LAYER HEIGHT	SECOND LAYER AMT.	SECOND LAYER TYPE & DIR.	SECOND LAYER HEIGHT	SUM-MA-TION TOTAL	THIRD LAYER AMT.	THIRD LAYER TYPE & DIR.	THIRD LAYER HEIGHT	SUM-MA-TION TOTAL	FOURTH LAYER AMT.	FOURTH LAYER TYPE & DIR.	FOURTH LAYER HEIGHT	TOTAL OPAQUE SKY COVER	PRESSURE TENDENCY	NET 3-HR CHANGE		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0058	29.860	54	51	83	10	10	ST	E10	0				U				U			10	6	.015		
0158	29.865	55	52	83	10															10				
0258	29.855	54	51	83	10															10				
0358	29.855	54	51	80	10	10	ST	M9	U				U				U			10	6	.005		
0458	29.855	54	51	83	10															10				
0558	29.860	54	50	77	10															10				
0658	29.875	54	51	80	10	10	ST	E11	U				U				U			10	3	.020		
0758	29.890	54	51	80	10															10				
0858	29.895	57	52	72	9															9				
0958	29.905	58	53	72	9	2	ST	11	7	CI	250	9	0			9	0			4	1	.030		
1058	29.895	59	53	67	7															3				
1158	29.875	60	53	64	9															6				
1258	29.850	59	52	64	10	1	ST	11	7	Ac	E180	8	2	CS	250	10				7	7	.055		
1358	29.890	59	52	62	8															6				
1458	29.845	57	51	67	10															8				
1558	29.845	57	51	67	10	2	ST	30	5	AC	E1[illegible]	7	3	CS	250	10				8	5	.005		
1658	29.845	56	51	72	10															10				
1758	29.860	56	53	80	8															8				
1858	29.870	56	53	53	9	2	SC	30	4	AC	E100	6	3	CS	250	9				9	3	.225		
1958	29.872	56	53	83	10															10				
2058	29.875	56	53	83	10															10				
2158	29.875	56	53	83	10	6	SC	E30	4	AC	180	10	4				4			10	1	.005		
2258	29.890	56	54	86	10															10				
2358	29.880	55	53	85	4															4				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 8 NOVEMBER 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.8[illegible]	54	51	83	10	10	ST	E10	U				U				U			10	6	.015		
0158	29.855	55	52	83	10															10				
0258	29.855	54	51	83	10															10				
0358	29.855	54	51	80	10	10	ST	M9	U				U				U			10	6	.005		
0458	29.855	54	51	83	10															10				
0558	29.860	54	50	77	10															10				
0658	29.875	54	51	80	10	10	ST	E11	U				U				U			10	3	.020		
0758	29.890	54	51	80	10															10				
0858	29.895	57	52	72	9															9				
0958	29.905	58	53	72	9	2	ST	11	7	CI	250	9	0			9	0			4	1	.030		
1058	29.895	59	53	67	7															3				
1158	29.875	60	53	64	9															6				
1258	29.850	59	52	64	10	1	ST	11	7	AC	E180	8	2	CS	250	10				7	7	.055		
1358	29.890	59	52	62	8															6				
1458	29.845	57	51	67	10															8				
1558	29.845	57	51	67	10	2	ST	30	5	AC	E1[illegible]	7	3	CS	250	10				8	5	.005		
1658	29.845	56	51	72	10															10				
1758	29.860	56	53	80	8															8				
1858	29.870	56	53	[illegible]	9	2	SC	30	4	AC	E1[illegible]	6	3	CS	250	9				9	3	.025		
1958	[illegible]	56	53	[illegible]	[illegible]															10				
2058	29.875	56	53	83	10															10				
2158	29.875	56	53	83	10	6	SC	E30	4	AC	180	10	4				4			10	1	.005		
2258	29.870	56	54	96	10															10				
2358	[illegible]	56	53	[illegible]	4															4				

SYNOPTIC OBSERVATIONS

8 NOV

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_SP_SD_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		55	54										
	1350	1	0	0	0	55	54		0								
	0950	2	0	0	0	59	54		0								
	1550	3	0	0	0	60	57		0								
	2150	4	0	0	0	57	56		0								
	MID		0	0	0	56	55										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1010.6	1012.4	1010.3	1011.4
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1010.9	1012.7	1010.6	1011.7
BAROGRAPH 64	1010.6	1012.2	1010.2	1011.8
BAR. CORR. 65	+0.3	+0.5	+0.4	-0.1

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
60	54	0	0	0	7	01	2358					9	9		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 85	BEGAN 87	ENDED 88
			H	CONT	CONT

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 9 NOVEMBER 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HU-MID-ITY (%) 20	TOTAL SKY COVER 21	Clouds and Obscuring Phenomena: Lowest Layer AMT. 22	Lowest Layer TYPE & DIR. 23	Lowest Layer HEIGHT 24	Second Layer AMT. 25	Second Layer TYPE & DIR. 26	Second Layer HEIGHT 27	SUM-MA-TION TOTAL 28	Third Layer AMT. 29	Third Layer TYPE & DIR. 30	Third Layer HEIGHT 31	SUM-MA-TION TOTAL 32	Fourth Layer AMT. 33	Fourth Layer TYPE & DIR. 34	Fourth Layer HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.890	55	53	90	3	3	Ac	180	0			3	0			3	0			3	2	.015		
0158	29.885	55	53	90	2															2				
0258	29.870	54	52	90	3															3				
0358	29.855	53	51	89	3	3	Ac	180	0			3	0			3	0			3	7	.025		
0458	29.885	52	51	96	7															7				
0558	29.865	62	51	96	7															7				
0658	29.870	54	54	100	7	4	F		1	ST	30	5	2	As	180	7	0			7	2	.025		
0758	29.915	56	55	96	7															6				
0858	29.925	58	56	87	7															7				
0958	29.940	59	56	80	10	4	F		2	SC	E15	6	3	AC	160	9	1	CS	250	8	2	.050		
1058	29.935	62	56	70	10															8				
1158	29.910	62	56	70	10															4				
1258	29.885	63	56	65	10	2	H		2	Ac	160	4	6	CS	250	10	0			4	7	.050		
1358	29.885	61	55	67	10															4				
1458	29.875	59	53	69	10															5				
1558	29.875	59	53	69	7	2	SC	10	2	AC	160	4	3	CS	250	7	0			4	7	.010		
1658	29.880	57	53	57	7															4				
1758	29.890	56	53	83	6															3				
1858	29.905	56	53	83	6	3	SC	10	3	CS	250	6	0			6	0			3	2	.030		
1958	29.920	56	53	83	6															3				
2058	29.935	56	53	93	5															4				
2158	29.950	56	53	83	5	3	SC	10	2	CS	250	5	0			5	0			4	2	.045		
2258	29.955	56	53	83	3															2				
2358	29.955	56	53	80	2															2				

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OPNAV FORM 3140-6 (REV. 8-61) USAR FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMINTE ISLAND
DATE: 9 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	180 ⊕	5		H	192	55	52	33	03		007	205 1070			AA
R	0158	180 ⊕	5		H	181	55	52	32	04		007				AA
R	0258	180 ⊕	5		H	176	54	51	04	02		005				AA
R	0358	180 ⊕	5		H	174	53	50	00	00		005	708 1070 53			AA
RS	0458	-X 30 ⊕ E180 ⊕	2	*	GF	181	52	51	00	00		007	F4			AA
R	0558	-X30⊕E180⊕	2	*	GF	181	52	51	00	00		007	F4			
R	0658	-X30⊕E180⊕	2	2	GF	182	54	54	00	00		007	F4 208 1670			
RS	0758	-X 30⊕E180⊕	1½	1½	GF	191	56	55	00	00		011	F4			BK
R	0858	-X15⊕E180⊕	1½	1⅛	GF	194	58	54	00	00		011	F4 TWR USBY 1⅛			BK
R	0958	-XE15⊕160⊕250⊕	1½	1½	GF H	200	59	53	33	06		012	F4 217 1578 52			BK
RS	1058	-XE15⊕160⊕250⊕	2	2	H	198	62	52	34	07		012	H4 WND 300V050			BK
RS	1158	-X 160-⊕250-⊕	2½	2½	H	189	62	52	36	04		009	H2 WND LGT VRBL			RK
R	1258	-X 160-⊕250-⊕	2½	3	H	181	63	51	34	02		007	H2 WND LGT VRBL 719 1578			
/													TWR USBY 3			BK
S	1337	-X15⊕160-⊕250-⊕	3	3	H				30	06		007	H2 WND 270V360			BK
R	1358	-X15⊕160-⊕250-⊕	4	3	H	181	61	50	27	06		007	H2 TWR USBY 3 USBY			
/													LWR NE-E WND 240V330			BK
R	1458	15⊕E160⊕250⊕	10			177	59	49	26	06		006	WND 210V280			BK
R	1558	10⊕160⊕250-⊕	10			177	59	49	24	07		006	WND 210V270 703 1578 63			BK
R	1658	10⊕160⊕250-⊕	10			179	57	49	23	06		006	WND 230V280			BK
R	1758	10 ⊕ 250-⊕	7			182	56	51	26	06		007				
R	1858	10 ⊕ 250-⊕	7			188	56	51	30	07		009	210 1508			
R	1958	10 ⊕ 250-⊕	7			193	56	51	31	04		010				
R	2058	10⊕ 250 ⊕	7			198	56	51	32	06		012				
R	2158	10 ⊕ 250 ⊕	7			203	56	51	29	05		013	215 1508 63			
R	2258	10 ⊕	7			205	56	51	31	03		014				
R	2358	10 ⊕	7			205	56	50	32	04		014				

...ted aviation observation.

7 NOV

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	55	53	X	X	X	X	X	X	X	X		
	0350	1	0	0	0	56	53		0								
	0950	2	0	0	0	59	52		0								
	1550	3	0	0	0	63	59		0								
	2150	4	0	0	0	59	53		0								
	MID	X	0	0	0	56	56	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1011.0	1013.5	1011.3	1013.9
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1011.3	1013.8	1011.6	1014.2
BAROGRAPH 64	1010.3	1013.2	1011.2	1013.6
BAR. CORR. 65	+0.5	+0.6	+0.4	+0.1

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	52	0	0	0	7	24	1558					8	6		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
			H	CONT	0530
			GF	0930	1015
			H	0930	1440

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

* TOWER NOT MANNED

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWGED SAN CLEMENTE IS. DATE 10 NOV 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HU-MID-ITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUM-MA-TION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUM-MA-TION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.945	55	53	86	4	4	SC	10	0			4	0			4	0			4	8	.005		
0158	29.930	55	53	86	5															5				
0258	29.925	55	53	86	5															5				
0358	29.915	55	52	80	4	4	SC	10	0			4	0			4	0			4	7	.020		
0458	29.915	55	51	77	2															2				
0558	29.930	55	52	83	9															9				
0658	29.950	56	53	80	8	6	SC	E10	2	CS	250	8	0			8	0			7	3	.035		
0758	29.955	59	55	78	8															7				
0858	29.965	60	55	72	8															7				
0958	29.970	61	56	70	7	4	SC	10	3	CS	E250	7	0			7	0			5	1	.020		
1058	29.950	62	55	65	9															7				
1158	29.930	62	55	65	8															6				
1258	29.920	60	54	69	9	7	SC	B11	2	CS	250	9	0			9	0			8	7	.050		
1358	29.900	61	54	65	9															8				
1458	29.885	61	54	65	9															8				
1558	29.880	59	53	69	9	1	SC	11	8	CS	E250	9	0			9	0			7	7	.040		
1658	29.880	58	53	75	9															4				
1758	29.895	57	54	80	2															2				
1858	29.900	57	54	80	2	2	AS	180	0			2	0			2	0			2	3	.020		
1958	29.905	57	54	83	2															2				
2058	29.910	57	54	83	2															2				
2158	29.905	56	54	86	0	0			0			0	0			0	0			0	0	.005		
2258	29.900	56	54	90	8															8				
2358	29.900	56	55	93	2															2				

OPNAV FORM 3140-6 (REV. 8-61) NBAN FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMENTE IS.

DATE: 10 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	10 Ⓞ	7			202	55	51	31	03		013	802 1500			RR
R	0158	10 Ⓞ	7			196	55	51	00	00		011				RR
R	0258	10 Ⓞ	7			194	55	51	00	00		011				RR
R	0358	10 Ⓞ	7			191	55	49	00	00		010	710 1500 55			RR
R	0458	10 Ⓞ	7			191	55	48	00	00		010				RR
R	0558	E10 Ⓞ	7			196	55	50	00	00		011				RR
R	0658	E10Ⓞ250Ⓞ	10			203	56	50	31	02		013	312 1508			RW
R	0758	E10Ⓞ250Ⓞ	15			205	59	52	00	00		014				RW
R	0858	E10Ⓞ250Ⓞ	15			208	60	51	35	04		015				RW
RS	0958	10ⓄE250Ⓞ	15			211	61	51	33	04		015	WND LGT VRBL / 107 1508 55			RW
RS	1058	E15Ⓞ250Ⓞ	15			203	62	50	35	05		013	WND LGT VRBL			RW
RS	1158	150ⓄE250Ⓞ	15			196	62	50	30	05		011				RW
RS	1258	B11Ⓞ250Ⓞ	15			193	60	50	31	09		010	717 1508			AR
R	1358	E11Ⓞ250Ⓞ	15			186	61	49	30	08		008				RW
RS	1458	150ⓄE250Ⓞ	20			181	61	49	30	08		007				RW
R	1558	11ⓄE250Ⓞ	20			179	59	49	29	08		006	714 1508 63			RW
R	1658	180Ⓞ250-Ⓞ	10			179	58	50	31	06		006				RW
R	1758	180Ⓞ250Ⓞ	7			184	57	51	30	05		008				LK
R	1858	180Ⓞ	7			186	57	51	31	06		008	307 1010			LK
R	1958	180Ⓞ	7			187	57	52	31	04		009				LK
R	2058	180Ⓞ	7			189	57	52	30	04		009				LK
R	2158	O	7			188	56	52	31	02		009	002 62			LK
R	2258	E120Ⓞ	7			186	56	53	28	02		008				LK
R	2358	120Ⓞ	7			186	56	52	26	03		008				LK

ated aviation observation.

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	56	55	X	X	X	X	X	X	X	X		
	[illegible]	1	0	0	0	[illegible]	55		0								
	0950	2	0	0	0	62	55		0								
	1550	3	0	0	0	63	59		0								
	2150	4	0	0	0	59	56		0								
	MID	X	0	0	0	56	56	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS				
TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	[illegible]	1014.5	1011.5	1012.3
TOTAL CORR. 62	[illegible]	+0.3	+0.3	+0.3
STA. PRESS. 63	[illegible]	1014.8	1011.8	[illegible]
BAROGRAPH 64	[illegible]	1014.3	1011.4	1012.0
BAR. CORR. 65	[illegible]	+0.5	+0.4	[illegible]

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	55	0	0	0	13	29	1335					8	6		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 11 NOVEMBER 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	LOWEST LAYER AMT. 22	LOWEST LAYER TYPE & DIR. 23	LOWEST LAYER HEIGHT 24	SECOND LAYER AMT. 25	SECOND LAYER TYPE & DIR. 26	SECOND LAYER HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	THIRD LAYER TYPE & DIR. 30	THIRD LAYER HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	FOURTH LAYER TYPE & DIR. 34	FOURTH LAYER HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.890	56	54	90	0	0			0			0	0			0	0			0	7	.015		
0158	29.885	56	54	86	5															5				
0258	29.875	55	53	90	5															5				
0358	29.890	56	54	86	5	5	As	120	0			5	0			5	0			5	5	.000		
0458	29.890	56	55	93	9															9				
0558	29.855	56	55	93	9															9				
0658	29.890	57	56	96	10	9	As	E100	1	CS	250	10	u				u			10	5	.000		
0758	29.910	59	58	96	10															9				
0858	29.915	60	58	87	9															8				
0958	29.925	64	59	75	10	1	Ac	70	7	Ac	E120	8	2	CS	250	10	0			8	2	.035		
1058	29.915	64	58	67	10															9				
1158	29.900	63	56	65	10															9				
1258	29.870	62	56	70	10	1	Ac	70	8	As	E120	9	1	Ci	250	10	u			10	8	055		
1358	29.865	64	57	65	10															9				
1458	29.860	61	56	72	10															9				
1558	29.860	60	56	78	10	4	Ac	70	5	Ac	E100	9	1	Ci	250	10	0			9	6	.010		
1658	29.840	60	55	75	9															8.				
1758	29.870	60	55	75	10															10				
1858	29.870	60	56	78	10	10	As	E100	U				U				U			10	3	.010		
1958	29.870	60	56	78	10															10				
2058	29.875	61	56	75	10															10				
2158	29.870	60	58	87	10	10	As	E100	U				U				U			10	0	.000		
2258	29.870	60	58	87	10															10				
23[illegible]	29.865	60	58	90	10															10				

SYNOPTIC OBSERVATIONS

OPNAV FORM 3140-6 (REV. 8-61) WBAN FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSED SAN CLEMENTE ISLAND
DATE: 11 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer's initials (14)
R	0058	O	7			182	56	53	25	02		007	705			LH
R	0158	120 ⦶	7			181	56	52	27	02		007				LH
R	0258	120 ⦶	7			177	55	52	20	00		[illegible]				LH
R	0358	120 ⦶	7			182	56	52	27	04		007	500 1010 55			LH
RS	0458	M6 ⦷	7			182	56	54	28	03		007				LH
R	0558	E6 ⦷	7			181	56	54	00	00		007				LH
RS	0658	E100 ⦷ 250 ⊕	15			182	57	56	00	00		007	500 1028			RW
RS	0758	100 ⦶ E250 ⊕	15			189	59	58	33	02		009				RW
R	0855	120 ⦶ E250 ⦷	20			191	60	56	34	02		010	WND LGT VRBL			RW
R	0958	70 ⦶ E120 ⦷ 250 ⊕	20			194	64	56	34	03		011	212 1058 55			RW
R	1058	70 ⦶ E120 ⦷ 250 ⊕	20			191	64	53	29	04		010				RW
R	1158	70 ⦶ E120 ⦷ 250 ⊕	20			186	63	51	29	05		009				RW
R	1258	70 ⦶ E120 ⦷ 250 ⊕	20			176	62	52	27	03		005	819 1072			RW
R	1358	70 ⦶ E120 ⦷ 250 ⊕	25			174	64	52	27	05		005	BINOVC			RW
R	1458	70 ⦶ E120 ⦷ 250 ⊕	20		RW--	172	61	52	20	04		004	RB40			RW
R	1558	70 ⦶ E100 ⦷ 250 ⊕	20			172	60	53	22	04		004	BINOVC/RE15/60300 1052 65			RW
R	1658	80 ⦶ E120 ⦷ 250 ⦷	20			172	60	52	20	06		004				RW
R	1758	E100 ⊕	7			176	60	52	20	04		005				LH
R	1858	E100 ⊕	7		RW--	176	60	53	15	02		005	303 1070			LH
R	1958	E100 ⊕	7			176	60	53	13	02		005				LH
R	2058	E100 ⊕	7			177	61	53	00	00		006				LH
R	2158	E100 ⊕	3		RW-- F	176	60	56	21	06		005	000 1070 65			LH
R	2258	E10 ⊕	1		RW- F	176	60	56	18	05		005				LH
R	2358	E10 ⊕	2		F	[illegible]	60	57	17	04		005				LH

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_s H_s $M_s P_s D_s$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		56	55										
	0350	1	0	0	0	56	55		0								
	0950	2	0	0	0	64	56		0								
	1550	3	T	0	0	65	60		0								
	2150	4	T	0	0	61	60		2								
	MID		T	0	0	60	60										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM. 60				
OBSRVD. BAR 61	1011.8	1013.0	1010.8	1011.1
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	[illegible]	1013.3	1011.1	1011.4
BAROGRAPH 64	1011.0	1012.5	1010.7	1011.2
BAR. CORR. 65	+1.1	+0.8	+0.4	+0.2

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
[illegible]	55	T	0	0	06	20	1158					10	9		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
RW--	1440	1515	F	2140	CONT
RW--	1740	1850			
RW--	2145	2340			

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings. "Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

WBAN 10B

STATION NAVSED SAN CLEMENTE ISLAND DATE 12 NOVEMBER 1971

TIME (LST) 16	STATION PRES-SURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HU-MID-ITY (%) 20	TOTAL SKY COVER 21	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT. 22	TYPE & DIR. 23	HEIGHT 24	SECOND LAYER AMT. 25	TYPE & DIR. 26	HEIGHT 27	SUMMATION TOTAL 28	THIRD LAYER AMT. 29	TYPE & DIR. 30	HEIGHT 31	SUMMATION TOTAL 32	FOURTH LAYER AMT. 33	TYPE & DIR. 34	HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0058	29.840	60	58	90	10	10	ST	M5	U				U				U			10	8	.030		
0158	19.840	60	58	90	10															10				
0258	19.840	60	59	93	10															10				
0358	29.830	60	58	90	9	9	ST	M10	0			9	0			9	0			9	8	.010		
0458	29.810	59	57	90	9															9				
0558	29.860	58	56	87	1															1				
0658	29.880	58	57	93	1	1	CU	10	0			1	0			1	0			1	3	.050		
0758	29.900	59	56	83	3															3				
0858	29.920	59	56	80	7															7				
0958	29.935	60	55	75	4	4	CU	10	0			4	0			4	0			4	1	.055		
1058	29.935	61	55	67	3															3				
1158	29.915	62	54	6c	2															2				
1258	29.910	61	54	62	5	5	CU	10	0			5	0			5	0			5	8	.025		
1358	29.905	62	54	60	2															2				
1458	29.905	61	54	62	0															0				
1558	29.895	60	52	58	0	0			0			0	0			0	0			0	8	.015		
1658	29.900	58	52	67	0															0				
17[illegible]	29.920	57	62	72	0															0				
18[illegible]	29.925	56	52	77	0	0			0			0	0			0	0			0	2	.030		
19[illegible]	29.925	56	53	80	0															0				
20[illegible]	29.925	56	53	80	0															0				
21[illegible]	[illegible]	56	53	80	0	0			0			0	0			0	0			0	3	.015		
22[illegible]	29.940	56	53	80	0															0				
23[illegible]	[illegible]	56	53	83	0															0				

Best Available Copy

OPNAV FORM 3140-6 (REV. 8-61)

NBAR FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION NLUSED SAN CLEMENTE ISLAND

DATE 12 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(14)	(14b)	Observer initials (15)
R	0058	M5 ⊕	2		RW--F	166	60	57	19	04		002	810 1611			LH
R	0158	E5 ⊕	1/2		RW F	166	60	57	20	06		002				LH
R	0258	W1X	1/8		F	166	60	58	25	06		002				LH
R	0358	M10 Φ	3		F	162	60	57	26	06		001	80304/1600 60			LH
R	0458	F10 Φ	3		F	166	59	56	29	11		002				LH
R	0558	10 Φ	7			172	58	54	28	07		004				LH
R	0658	10 Φ	20			179	58	56	27	08		006	317 1100			RW
S	0735	E10 Φ	20						28	11		008				RW
RS	0758	10 Φ	25			186	59	54	29	12		008				RW
S	0832	E10 Φ	25						30	11		009	ΦVΦ			RW
R	0858	E10 Φ	25			193	59	53	30	13		010				RW
RS	0958	10 Φ	30			198	60	52	32	11		012	119 1100 58			RW
R	1058	10 Φ	30			198	61	50	31	13		012				RW
L	1128	10 Φ	30				62	48	31	11		011	ACFT MISHAP			AL
R	1158	10 Φ	30			191	62	48	30	11		010				AR
R	1258	10 Φ	30			189	61	48	31	10		009	808 1100			RW
R	1358	10 Φ	30			188	62	48	30	11		009				RL
R	1458	O	30			188	61	48	30	10		009	FEW Sc NE			RL
R	1558	O	30			184	60	45	29	12		008	805 63			RL
R	1658	O	30			186	58	47	28	10		008				RL
R	1758	O	15			193	57	48	29	12		010				BK
R	1858	O	10			194	56	49	30	12		011	210			BK
R	1958	O	10			194	56	50	30	12		011	WND 260V330			BK
R	2058	O	10			194	56	50	30	16		011	WND 280V320			BK
R	2158	O	10			200	56	50	30	16	G21	012	WND 280V320 305 63			BK
R	2258	O	15			200	56	50	30	13	G17	012	WND 280V310			BK
R	2358	O	15			194	56	51	30	12		011				BK

* aviation observation.

SYNOPTIC OBSERVATIONS

TIME (GCT) 41	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_s H_s $M_sP_sD_s$ 54	WATER TEMP. 55	56	57	58
	MID TO		.04	0		60	60										
	[illegible]	1	.04	0	0	60	60		2								
	[illegible]	2	0	0	0	60	58		2								
	1550	3	0	0	0	63	60		1								
	2150	4	0	0	0	60	56		0								
	MID		0	0	0	56	56										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	0355	0955	1555	2155
ATT. THERM 60				
OBSRVD. BAR 61	1037.8	1013.4	1012.0	1013.5
TOTAL CORR. 62	+0.3	+0.3	+0.3	+0.3
STA. PRESS. 63	1010.1	1013.7	1012.3	1013.8
BAROGRAPH 64	1010.0	1012.9	1011.9	1013.2
BAR. CORR. 65	+0.1	+0.8	+0.4	+0.6

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	56	.04	0	0	21	30	2135					1	3		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88
RW--	0020	2135	F	Cont	0535
RW	0145	0215			

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

NEAN 16B

STATION NWSED SAN CLEMENTE ISLAND DATE 13 NOVEMBER 1971

TIME (LST) 16	STATION PRESSURE (Ins) 17	DRY BULB (°F) 18	WET BULB (°F) 19	REL. HUMIDITY (%) 20	TOTAL SKY COVER 21	Lowest Layer AMT. 22	Lowest Layer TYPE & DIR. 23	Lowest Layer HEIGHT 24	Second Layer AMT. 25	Second Layer TYPE & DIR. 26	Second Layer HEIGHT 27	SUMMATION TOTAL 28	Third Layer AMT. 29	Third Layer TYPE & DIR. 30	Third Layer HEIGHT 31	SUMMATION TOTAL 32	Fourth Layer AMT. 33	Fourth Layer TYPE & DIR. 34	Fourth Layer HEIGHT 35	TOTAL OPAQUE SKY COVER 36	PRESSURE TENDENCY 37	NET 3-HR CHANGE 38	39	40
0055	[illegible]	56	53	83	0	0			0			0	0			0	0			0	7	.015		
0155	29.910	56	53	81	1															1				
0255	29.910	56	54	86	1															1				
0355	29.910	57	54	80	1	1	ST	10	0			1	0			1	0			1	6	.015		
0455	[illegible]	57	54	83	1															1				
0555	[illegible]	56	53	83	1															1				
0655	29.940	56	53	83	3	3	SC	10	0			3	0			3	0			2	7	[illegible]		
0758	29.960	58	54	72	6															6				
0855	29.955	60	55	72	4															4				
0955	29.955	61	55	67	3	3	SC	20	0			3	0			3	0			3	1	.015		
1055	29.935	62	54	60	3															3				
1155	29.910	62	55	62	3															3				
1253	29.875	62	54	60	2	2	SC	20	0			2	0			2	0			2	6	.060		
1355	29.880	63	55	58	1															1				
1455	29.870	61	54	65	3															3				
1558	[illegible]	60	54	62	5	4	CU	10	1	AC	120	5	0			5	0			5	7	.035		
1656	29.855	58	53	75	4															4				
1755	[illegible]	58	55	[illegible]	10															10				
1855	[illegible]	58	[illegible]	[illegible]	2	2	SC	10	0			2	0			2	0			2	7	[illegible]		
1955	[illegible]	57	54	80	1															1				
2055	[illegible]	[illegible]	[illegible]	[illegible]	1															1				
2155	[illegible]	56	51	72	1	1	ST	10	0			1	0			1	0			1	7	[illegible]		
2255	[illegible]	[illegible]	[illegible]	[illegible]	0															0				
2355	[illegible]	[illegible]	51	[illegible]	0															0				

SYNOPTIC OBSERVATIONS

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OPNAV FORM 3140-6 (REV. 8-61)

NWSA Form 124

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: UNSED SAN CLEMENTE ISLAND

DATE: 13 NOVEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of Feet) (3)	Visibility (Statute Miles) Surface (4)	Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(14a)	(14b)	Observer's initials (15)
R	0058	0	10			194	56	51	30	11		011				BK
R	0158	10⦶	10			186	56	51	32	11		008				BK
R	0258	10⦶	7			181	56	52	30	10		009				BK
R	0358	10⦶	10			189	57	51	30	10		009	605 1600 56			BK
R	0458	10⦶	10			194	57	52	30	12		011				BK
R	0558	10⦶	15			196	56	51	30	12		011				BK
R	0658	10⦶	15			200	56	51	30	13		012	210 1500			BK
R	0758	E10⦶	25			207	58	51	31	12		014				RW
R	0858	20⦶	25			205	60	51	33	10		014				RW
R	0958	20⦶	25			205	61	50	33	08		014	105 1500 56			RW
R	1058	20⦶	25			198	62	48	32	10		012				RW
R	1158	20⦶	25			189	62	49	31	14		009				RW
R	1258	20⦶	25			184	62	48	31	15	G19	008	620 1500			RW
R	1358	20⦶	25			179	63	48	31	13	G18	006	ACSL NW			RW
R	1458	20⦶120⦶	25			176	61	49	30	13		005				RW
R	1558	10⦶120⦶	25			172	60	50	30	13		004	712 1140 63			RW
R	1658	10⦶	20			171	58	50	29	14		01?	ACSL W			RW
S	1735	M9⊕	7						29	15	G20	003				BK
R	1758	E9⊕	7			167	58	52	30	14		003				BK
R	1858	10⦶	10			166	58	52	27	10		002	707 1500			BK
R	1958	10⦶	15+			162	57	51	28	11		001				BK
R	2058	10⦶	15+			161	56	45	30	16	G23	[illegible]				BK
R	2158	10⦶	15+			159	56	47	28	16	G23	000	707 1100 63			BK
R	[illegible]	0	15+			159	56	47	29	17	G25	[illegible]				BK
R	[illegible]	0	15+			154	56	46	30	17	G23	[illegible]				BK

Best Available Copy

TIME (GCT) 4	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_SP_SD_S$ 54	WATER TEMP. 55	56	57	58
	MID TO		0	0		57	56										
	[illegible]50	1	0	0	0	57	56	0									
	[illegible]	2	0	0	0	62	56	0									
	1550	3	0	0	0	63	60	0									
	2150	4	0	0	0	60	56	0									
	MID		0	0	0	56	56										

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	[illegible]	0955	1555	2155
ATT THERM 60				
OBSRVD. BAR 61	1012.5	1014.0	1010.8	[illegible]
TOTAL CORR. 62	[illegible]	+0.3	+0.3	[illegible]
STA. PRESS 63	1012.8	1014.3	1011.1	[illegible]
BAROGRAPH 64	1012.2	1013.6	1011.5	[illegible]
BAR CORR. 65	+0.6	+0.7	-0.4	+0.1

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
63	56	0	0	0	25	30	[illegible]					1	[illegible]		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

FASTEST RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

OPNAV FORM 3140-7 (4-65)
0107-711-1001

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

NBAN 10B

STATION NWSED SAN CLEMENTE ISLAND DATE 14 NOVEMBER 1971

TIME (LST)	STATION PRESSURE (Ins)	DRY BULB (°F)	WET BULB (°F)	REL. HUMIDITY (%)	TOTAL SKY COVER	CLOUDS AND OBSCURING PHENOMENA: LOWEST LAYER AMT.	TYPE & DIR.	HEIGHT	SECOND LAYER AMT.	TYPE & DIR.	HEIGHT	SUMMATION TOTAL	THIRD LAYER AMT.	TYPE & DIR.	HEIGHT	SUMMATION TOTAL	FOURTH LAYER AMT.	TYPE & DIR.	HEIGHT	TOTAL OPAQUE SKY COVER	PRESSURE TENDENCY	NET 3-HR CHANGE		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0055	29.785	56	51	69	0	0			0			0	0			0	0			0	7	.035		
0155	29.776	55	50	72	0															0				
02[illegible]	[illegible]	53	51	74	0															0				
03[illegible]	[illegible]	54	49	71	0	0			0			0	0			0	0			0	7	.025		
04[illegible]	29.765	54	50	74	0															0				
05[illegible]	29.760	55	50	72	1															3				
06[illegible]	[illegible]	55	51	74	4	4	Sc	10	0			4	0			4	0			3	5	.000		
0755	29.780	57	51	62	9															9				
0856	29.770	58	51	60	7															7				
0958	29.775	60	52	55	4	4	Sc	40	0			4	0			4	0			4	1	.035		
10[illegible]	29.785	60	52	55	1															1				
11[illegible]	29.760	62	51	44	0															0				
1255	29.740	62	51	44	0	0			0			0	0			0	0			0	6	.055		
13[illegible]	29.730	62	51	44	0															0				
1455	29.725	62	52	48	0															0				
1553	29.720	60	51	51	0	0			0			0	0			0	0			0	6	.03[illegible]		
16[illegible]	29.72[illegible]	58	50	55	0															0				
17[illegible]	[illegible]	57	51	64	0															0				
18[illegible]	[illegible]	56	51	68	0	0			0			0	0			0	0			0	3	.015		
19[illegible]	[illegible]	56	51	72	0															0				
20[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]																			
21[illegible]	[illegible]	[illegible]	50	[illegible]	[illegible]	[illegible]			[illegible]			[illegible]	[illegible]			[illegible]	[illegible]			[illegible]	[illegible]	[illegible]		
22	[illegible]	[illegible]	51	[illegible]	[illegible]															[illegible]				
23	[illegible]	[illegible]	[illegible]																					

SYNOPTIC OBSERVATIONS

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OPNAV FORM 3140-6 (REV. 8-61) NOAA FORM 10A

DEPARTMENT OF THE NAVY
SURFACE WEATHER OBSERVATIONS
(LAND STATIONS)

STATION: NWSFD SAN CLEMENTE ISLAND
DATE: 14 DECEMBER 1971

Type (1)	Time (LST) (2)	Sky and ceiling (Hundreds of feet) (3)	Visibility (Statute miles) Surface (4)	Visibility Tower (4a)	Weather and obstructions to vision (5)	Sea level press. (Mbs.) (6)	Temp. (°F) (7)	Dew pt. (°F) (8)	Wind Direction (9)	Wind Speed (Kts) (10)	Wind Character and shifts (11)	Altimeter setting (Ins.) (12)	Remarks and supplemental coded data (13)	(13a)	(13b)	Observer initials (14)
[illegible]	[illegible]	O	15+			147	56	46	31	18	G23	19[illegible]	712			BK
R	[illegible]	O	15+			14[illegible]	55	46	31	19	G24	19[illegible]				BK
R	[illegible]	O	15			141	55	47	31	20	G25	195				BK
R	[illegible]	O	15			138	54	4[illegible]	31	18	G25	19[illegible]	708 54			BK
R	[illegible]	O	15			134	54	46	32	13	G17	[illegible]				BK
R	[illegible]	100	15			1[illegible]	55	46	32	13	G19	[illegible]				BK
R	[illegible]	100	15			138	55	47	32	11		[illegible]	500 1500			BK
R	[illegible]	150B23 (D	10			14[illegible]	57	46	34	09		99[illegible]	TCU NE/RWU W			RW
R	[illegible]	150E23 (D	50			149	58	44	34	10		997				RW
R	[illegible]	100	50			151	60	44	33	14		[illegible]	112 1500 54			RW
R	[illegible]	100	50			1[illegible]	[illegible]	[illegible]	34	14		99[illegible]				RW
R	[illegible]	O	40			138	62	40	33	12		[illegible]				RW
[illegible]	[illegible]	O	40			132	62	40	34	13		[illegible]	619			RW
[illegible]	135[illegible]	O	40			128	62	40	33	13	G18	991				RW
R	145[illegible]	O	40			12[illegible]	62	42	33	13		991				RW
R	155[illegible]	O	30			124	61	42	32	14		[illegible]	601 63			RW
R	165[illegible]	O	30			12[illegible]	58	45	31	12	G17	98[illegible]				RW
R	175[illegible]	O	15			12[illegible]	57	45	31	14	G19	991				BK
R	1[illegible]	O	15			1[illegible]	[illegible]	[illegible]	30	13	G18	[illegible]	305			BK
R	[illegible]	O	15			1[illegible]	[illegible]	47	31	11		[illegible]				BK
R	[illegible]	O	15			1[illegible]	[illegible]	[illegible]	31	14		[illegible]				BK
R	[illegible]	O	15			1[illegible]	[illegible]	[illegible]	3[illegible]	10		[illegible]	400 63			BK
[illegible]	[illegible]	[illegible]	[illegible]			12[illegible]	51	[illegible]	[illegible]	[illegible]		[illegible]				[illegible]
R	[illegible]	O	[illegible]			121	51	[illegible]	[illegible]	[illegible]		[illegible]				[illegible]

ACTUAL OBSERVATION.

Best Available Copy

[illegible]	TIME (LST) 42	NO. 43	PRECIP. (Ins) 44	SNOW FALL (Ins) 45	SNOW DEPTH (Ins) 46	MAX. TEMP. (°F) 47	MIN. TEMP. (°F) 48	49	STATE OF GRND 50	SEA STATE & DIR. 51	SWELL HGT. & DIR. 52	SWELL PERIOD 53	SURF H_S H_S $M_S P_S D_S$ 54	WATER TEMP. 55	56	57	58
	MID TO	X	0	0	X	[illegible]	[illegible]	X	X	X	X	X	X	X	X		
	[illegible]	1	0	0	0	[illegible]	[illegible]		0								
	0950	2	0	0	0	60	54		0								
	1550	3	0	0	0	63	60		0								
	[illegible]	4	0	0	0	60	56		0								
	MID	X	0	0	0	57	56	X	X	X	X	X	X	X	X		

STATION PRESSURE COMPUTATIONS

TIME (LST) 59	[illegible]	0955	1555	[illegible]
ATT. THERM. 60				
OBSRVD BAR 61	[illegible]	[illegible]	1006.1	[illegible]
TOTAL CORR. 62	[illegible]	+0.3	+0.3	[illegible]
STA. PRESS. 63	[illegible]	[illegible]	1006.4	[illegible]
BAROGRAPH 64	[illegible]	[illegible]	1005.9	[illegible]
BAR. CORR. 65	+0.5	+0.5	+0.5	[illegible]

SUMMARY OF DAY (MIDNIGHT TO MIDNIGHT)

24-HR. MAX. TEMP. (°F) 66	24-HR. MIN. TEMP. (°F) 67	24-HR. PRECIP. WATER EQUIV. (Ins.) 68	24-HR. SNOWFALL UNMLTD (Ins.) 69	SNOW DEPTH (Ins.) 70	PEAK GUSTS SPEED 71	PEAK GUSTS DIRECTION 72	PEAK GUSTS TIME (L.S.T.) 73	74	75	76	77	SKY COVER SUNRISE TO SUNSET 78	SKY COVER MIDNIGHT TO MIDNIGHT 79	80	81
[illegible]	54	0	0	0	26	31	[illegible]					2	1		

PRECIP. AND THDRSTM. 82	BEGAN 83	ENDED 84	OBSTR. TO VISION 86	BEGAN 87	ENDED 88

90. REMARKS, NOTES AND MISCELLANEOUS PHENOMENA

[illegible]: RECORDED ONE MINUTE WIND SPEED	ASSOCIATED DIRECTION	TIME
KNOTS		

NOTE: There are no required entries in columns without headings.
"Any data needed locally may be entered".

XI. ACKNOWLEDGEMENTS

The measurement program and the data analysis described in this report involved many people. The conscientious effort and enthusiasm of the following people was essential for the successful outcome of the project: K. D. Anderson, M. L. Fontenot, L. J. Goodson, W. K. Horner, Dr. D. R. Jensen, M. L. Phares, J. F. Theisen, and C. S. Thomas. Special appreciation goes to Dr. E. E. Gossard who initiated the project and whose guidance lead to our present knowledge of microwave radio propagation in the oceanic evaporation duct.

Part II: Results from the Key West Measurements

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SUMMARY

Carefully controlled propagation measurements were performed for two weeks in May 1972 between Key West and the Marquesas Keys. Location and season were chosen in order to duplicate closely conditions under which measurements were performed by the Applied Physics Laboratory in 1970. The evaporation duct was found to influence X-band and Ku-band frequencies significantly. A low sited X-band antenna (16 feet above mean sea level) received higher signals 60% of the time compared to a high sited antenna (64 feet above mean sea level). Radio data and ducting conditions were found to be well correlated. It appears that ducting conditions encountered in May may be found during the rest of the year. These findings are in agreement with APL's conclusions. Whether these measurements over extremely shallow and reef protected waters can be considered representative of ducting conditions for all tropical climates remains to be established. APL's persistently measured extraordinary vertical gradients of signal strength could not be verified either by measurements or by calculations.

I. BACKGROUND

Part I of this series of reports (reference 1) described extensive measurements in the Southern California off-shore area. These measurements investigated the influence of the oceanic surface evaporation duct on microwave radio propagation and more specifically the question of optimum shipboard antenna heights. The results for this area showed that the evaporation duct strongly influenced propagation conditions for X-band frequencies but rarely caused the signals to decrease with height (the condition for which low sited antennas receive higher signals and therefore produce larger detection ranges). These findings were in sharp contrast to measurements done by the Applied Physics Laboratory of the Johns Hopkins University in the Key West area during May 1970 (reference 2). While it was realized that the climatological conditions in the Key West area could produce significantly different ducting conditions, some of the APL data showed field strength versus height profiles with extraordinary vertical gradients. As an example, figure 1 shows averages of profiles measured by APL which display over 30 dB decreases in path loss with height within a few feet. All of these profiles were measured on a 40' telescopic mast having an elevator which carried the receiving antenna. A typical measured refractivity profile, shown in figure 2, was used to calculate a path loss versus height curve for a transmitter height of five feet. The calculations were performed using NELC's waveguide computer program. This program permits radio propagation conditions to be calculated in a waveguide with an arbitrary refractive index profile perpendicular to the direction of propagation. The calculated path loss versus height dependence for the refractivity profile of figure 2 is shown in figure 1 and labelled

NELC calculation. There are two distinct differences between the measured and the calculated profiles. First, the measured field strength (or path loss) values are 20-30 dB less than the calculated and second, the sharp decrease in the measured profiles occurs at a height range where the calculated profile changes very slowly. The discrepancy of both absolute values and shape between measured and calculated profiles in figure 1 is in contrast to the usually good agreement between NELC measured and calculated profiles. As shown in figure 3, even a fictitious refractivity profile with a 50 M-units change between 39' and 40' failed to produce a height gain function with vertical gradients similar to the measured curve in figure 1.

All measurements presented in reference 2 were conducted on 9 different days. One attempt to justify the unusual height gain profiles in reference 2 was that the 9 days were characterized by unusual meteorological conditions. These conditions might not have shown up in a measured refractivity profile like the one in figure 2 because it was measured over land. For these reasons it was decided to perform continuous propagation measurements under conditions that would closely duplicate APL's measurements. A nearly identical propagation path was selected and measurements were conducted during the same season.

II. OBJECTIVE

Conduct in the Key West area well controlled measurements to assess the role of the oceanic surface evaporation duct on microwave radio propagation. Season and location of the measurements were chosen to coincide with APL's 1970 (reference 2) measurements in order to provide a basis for comparison of the data.

III. APPROACH

Following the approach described in reference 1, a propagation link was established between two islands. The transmitter was placed on the Marquesas Keys and the receiving mast at the Naval Station in Key West. This path, shown in figure 4, is just slightly north of the APL path and about 2 miles shorter than buoy A location for the APL measurements. The NELC path was selected so that it did not cross any islands. The transmitter on the Marquesas Keys is shown in figure 5. It is the same arrangement described in reference 1 but with the addition of a Ku-band frequency (17.9643 GHz). This addition necessitated a separate antenna and the use of waveguide transmission lines. The Ku-band antenna gain was 36 dB and the radiated power 12 dBm. Transmitter antenna height was 7 feet above mean sea level (10' for the L-, S-, X-band antenna). Figure 6 shows a block diagram of the Ku-band transmitter.

The receiver mast is shown in figure 7. The antenna heights for L-, S-, and X-band were 16, 32, and 64 feet and for Ku-band 13, 29, and 61 feet. Figure 8 shows a block diagram for the Ku-band receiver (the receivers for the other frequencies are identical to the ones described in reference 1).

The minimum detectable signal for Ku-band was -100 dBm which permits a maximum path loss value of 184 dB to be measured. The performance of the Ku-band link was troubled by numerous difficulties and equipment failures. Therefore, data were gathered only intermittently during the observation period.

IV. RESULTS

A. Propagation Measurements

Figures 9-11 show in the upper portions path loss for the three vertically spaced L-band antennas as a function of time. Equipment failures are responsible for the missing data. The lower part of figures 9-11 shows the difference of the logarithmic path loss values for various antenna combinations. The data indicate that path loss decreases (or received power increases) with height. The path loss differences between higher and lower sited antennas are, therefore, always positive. The fading during five minute intervals for the three antennas is shown in figure 12. Fading as used here is the peak to peak signal fluctuation with respect to the mean signal level within a 5 minute interval. The time constant of the recording system eliminated fluctuation faster than 4 seconds. Higher fading is observed on the lower antennas. The information of figures 9-12 is presented in tabular form in table 1. The first block of numbers in table 1 gives the percentage of time signals received on the higher antenna exceed the signals received on the lower antenna by a certain value in dB. No reversals (i.e. higher signals on the low antenna) occurred during the measurement period. In 99.6% of the time the signals received on the high antenna exceeded the ones received on the low antenna by 6 dB. The second and third block in the upper part of table 1 give the mid-low and high-mid antenna comparison. The blocks in the lower portion of table 1 give the percentage of time specific fading values in dB are exceeded. Fading values larger than 5 dB are observed 0.3% of the time for the high antenna, 3.8% of the time for the middle antenna, and 7% of the time for the low antenna.

Frequency distributions of path loss, path loss difference between antenna combinations, and fading are shown in figures 13-15. The corresponding numbers are listed in tables 2-4. The presentation of figures 13-15 is believed to provide a convenient visual aid in judging quantitative effects of ducting on the vertically spaced antennas.

Figures 16-18 show path loss and path loss differences for the various antenna combinations for S-band. Also for this frequency, received signals increase with antenna height and fading, shown in figure 19, decreases with antenna height. Missing data are, again, due to equipment failures. Table 5 presents the information of figures 16-19 in tabular form. The frequency distributions for S-band are shown in figures 20-22 and tabulated in tables 6-8.

While ducting conditions did not appear to have a significant influence on L- and S-band frequencies, they did have an influence on higher frequencies. Figures 23-25 show path loss and path loss differences between antenna combinations for X-band. Path loss dramatically increases with antenna height shifting the path loss difference curves to negative values a large percentage of the time. Also, the fading trend is reversed as shown in figure 26. Under conditions of strong ducting, e.g. between 10-14 May, the signals are quite high and little fading occurs on the low antenna. The physical interpretation of this phenomenon is that the evaporation duct strongly trapped the energy close to the water surface. This resulted in high, non-fluctuating signals close to the water and in low, fluctuating signals higher up. However, even though strong trapping conditions may persist over days as shown in the above example, they also may break up rapidly. Signal changes in the order of 30 dB may occur in relatively short time intervals. The period of 14-20 May was characterized by such fluctuations. Table 9 shows that the lower antenna received equal or higher signals 61.4% of the time and exceeded the higher antenna by 10 dB 37.1% of the time. However, a 20 dB difference between the high and the low antenna was observed only 3.9% of the time. Strong gradients between adjacent antennas were measured infrequently. Only in about 1% of the time was a 15 dB difference observed between the high and the middle antenna or the middle and the low antenna. Persistent, strong gradients measured by APL at even lower frequencies (C-band) are not evident in these data.

In figure 27 the distributions of path loss for the three antennas illustrate an interesting effect ducting may have on various antenna heights. The lowest antenna shows the widest spread of path loss with the spread narrowing as antenna height increases. Ducting conditions characterized by duct heights in the range from approximately 30-100 feet affect the low antenna more than the higher ones which explains the low path loss values. Under other ducting conditions (notably neutral conditions), the lower antenna receives smaller signals than higher antennas which results in high path loss values for the low antenna. Siting an antenna low will, therefore, yield both extremes of much higher and much lower signals depending on ducting conditions. Table 10 lists the numerical values for figure 27. Also figure 28 (numerical values in table 11) shows distributions with different spread. However in this case, the spread is both an indication of stronger ducting effects on lower antennas and an indication of spatial correlation. The spatial separation is largest (48 feet) for the high-low antenna combination and smallest (16 feet) for the mid-low antenna combination. Accordingly, the high-mid combination shows the narrowest spread and the high-low antenna the widest spread. Finally, figure 29 (numerical values in table 12) shows the fading distribution. The physical reason for the lesser fading on the low antennas had been explained above.

Every effort was made to include Ku-band into the Key West measurements. Slippage of delivery schedules by the manufacturers resulted in delivery of the major components after the propagation experiment had started. The Ku-band propagation link was assembled in Key West under field operation conditions and performed so unreliably that only spotty measurements were obtained. They resulted in a total observation time of approximately 30 hours and are included here for completeness. Figures 30-36 and tables 13-16 follow the same format as the previously discussed frequencies and show that Ku-band, similar to X-band, was strongly affected by the existing ducting conditions. During the 30 hours of observation, the lower antenna received equal or higher signals than the high antenna 76.8% of the time and outperformed the high antenna by 10 dB during 63.6% of the time.

B. Meteorological Comparisons

No meteorological measurements were performed by NELC at Key West except measurement of sea water temperatures at the receiver site. These sea water temperature measurements were used in connection with the standard weather bureau data taken at the international airport in Key West (see appendix for station location) in order to calculate duct height.

Figures 37 and 38 are plots (at every three hours during the measurement period) of relative humidity, wind speed, air-sea temperature difference, and air temperature. Those data were used to calculate duct height δ assuming a log-linear profile (Monin-Obukhov profile) according to the following formulas:

$$\delta = - \left[\frac{0.0013 \left(\ln \frac{z_1}{z_o} + \frac{z_1}{L'} \right)}{\phi_A - \phi_S} + \frac{\alpha}{L'} \right]^{-1} \quad \text{cm}$$

$$\phi_A = \frac{77.6}{T_A} \left[1000 + \frac{4810}{T_A} e \right]$$

$$\phi_S = \frac{77.6}{T_{SW}} \left[1000 + \frac{4810}{T_{SW}} e_{SW} \right]$$

$$L' = \frac{\dfrac{\dfrac{(u \cdot 51.4444)^2}{980\ (T_A - T_{SW})}}{T_{SW}} - \alpha z_1}{\ln \dfrac{z_1}{z_o}} \quad \text{cm}$$

$z_1 = 500$ cm

$z_o = 0.0015$ cm ($u \leq 10$ Knots)

$\alpha = 2.0$

e in mb, T in Kelvin, u in knots

T_A = air temperature

T_{SW} = sea water surface temperature

e_{SW} = saturated vapor pressure at sea surface

Conditions of thermal stability with bulk Richardson's numbers exceeding 0.1 were eliminated for duct height calculations. Bulk Richardson's number is given by

$$R_{ib} = 6.4 \frac{T_A - T_{SW}}{u^2}$$

T in Kelvin, u in knots

Figure 39 shows calculated duct height for the measurement period. Variations in duct height follow closely variations in wind speed. This is not too surprising as the other parameters influencing duct height showed less variation than wind speed. Therefore, the close correlation of wind speed and duct height observed during 8-22 May 1972 at Key West can not be generalized. Figures 40 and 41 are overlays of path loss for the low X-band antenna (figure 25) and duct height and wind speed. The correlation between signal levels (path loss values) and duct heights is remarkable particularly if one considers the serious short comings of the meteorological data (air temperature, relative humidity, and wind velocity measured over land, sea water temperature measured close to shore). The good agreement between routinely measured meteorological data and propagation data suggested calculations of duct height for a longer period in order to see whether propagation conditions would be expected to be different in other periods. Considerable time was spent to locate useable sea water temperature measurements taken for at least one year. Surface water temperature measurements were finally obtained from the Marine Research Foundation in Key West. The data were taken from August 1970 to October 1971 in the vicinity of Stock Island (exact location: 24° 33.05' N, 81° 44.10' W). The water depth at this location is approximately 8-10 feet. The data were taken between 1100-1300. The 1000 hours and the daily average readings of the landbased weather bureau data were used to calculate duct heights rather than the 1300 hours readings. At 1300, solar heating of the ground would be expected to overestimate air temperatures over the water. Figures 42 and 43 show duct heights calculated (for every third day) for the two sets of weather bureau readings. Duct heights calculated from this data base appear to be generally higher than the values for the May measurement period which may be due to a bias in the data. The important feature of figures 42 and 43 seems to be absence of significant seasonal changes on duct height. One may, therefore, conclude that the ducting condition measured in May will be similar during the rest of the year. It should be emphasized again that this conclusion is based on meteorological data whose use for duct height calculations may be seriously questioned.

V. CONCLUSIONS

During a two week measurement period in the Key West area ducting conditions were encountered which significantly influenced X-band and Ku-band frequencies. A low sited X-band antenna (16' above msl) received higher signals 60% of the time compared to a high sited antenna (64' above msl). Radio data and ducting conditions were found to be well correlated. It appears that ducting conditions encountered in May may be found during the rest of the year. These findings are in agreement with APL's conclusions. Whether these measurements over extremely shallow and reef protected waters can be considered representative of ducting conditions for all tropical climates remains to be established. APL's persistently measured extraordinary vertical gradients of signal strength could not be verified either experimentally or through various modelling attempts.

VI. RECOMMENDATIONS

Calculations of radio propagation conditions in the oceanic surface evaporation duct based on the use of existing climatological data have been found to agree reasonably well with actual measurements. It is, therefore, recommended to search for good climatological data in navigable tropical waters in order to establish whether ducting conditions in shallow waters of the Florida Keys are in fact representative of other tropical water bodies.

VII. REFERENCES

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2. Smith, G. "Description of the maritime ducting radar investigation and final report on the Key West experiment", APL Fleet Systems Report SMS-FS-425 (MRD-0-317) October 1970.

VIII. FIGURES

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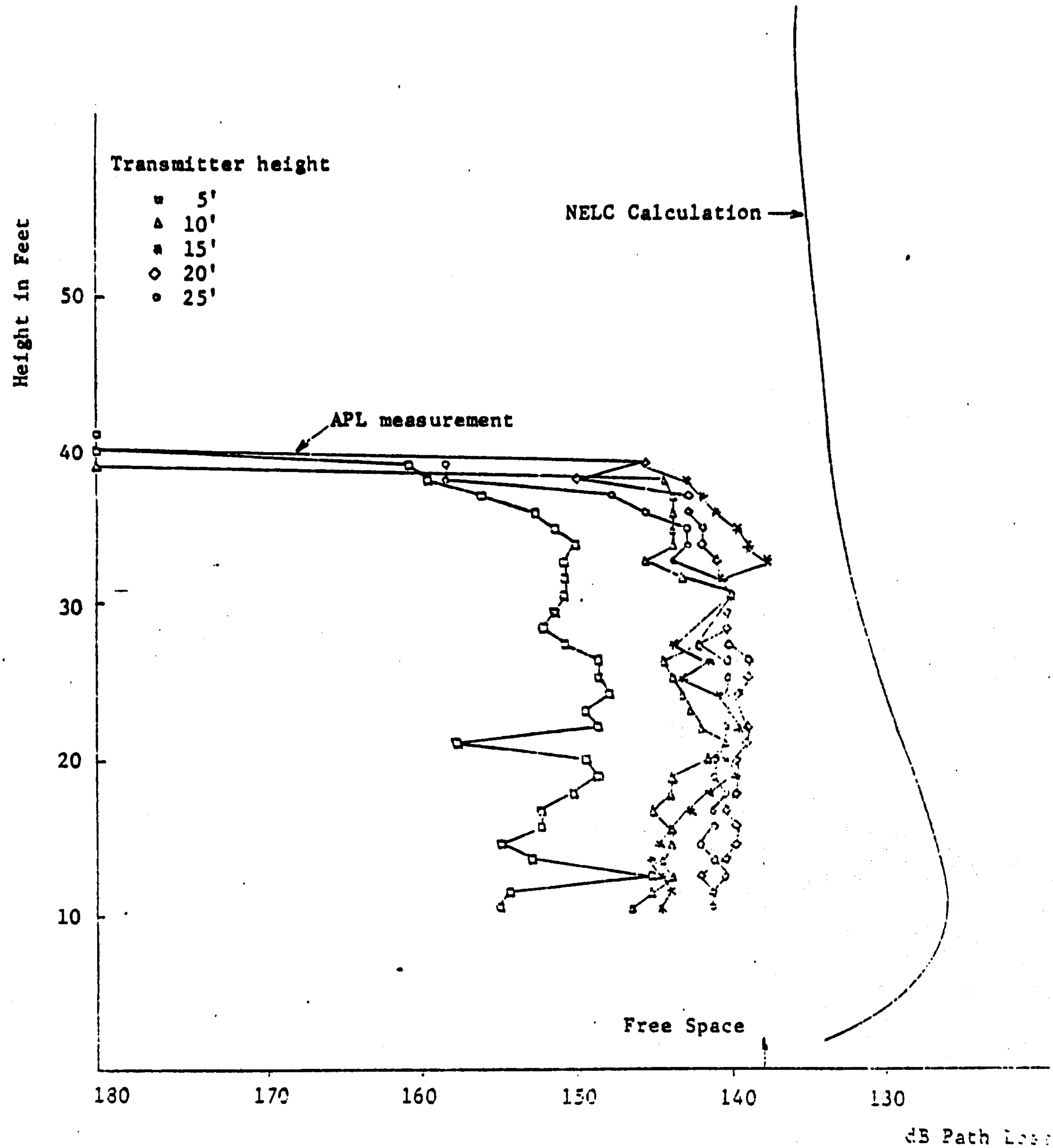


Figure 1. Measured and calculated path loss versus height profiles. The measured profiles were obtained at Key West at 5.85 GHz over a 17 n mi path for transmitter heights from 5'-25' and are averaged over days. (From reference 2, figure 41) The calculated profile is based on the refractivity profile of figure 2 and a transmitter height of five feet.

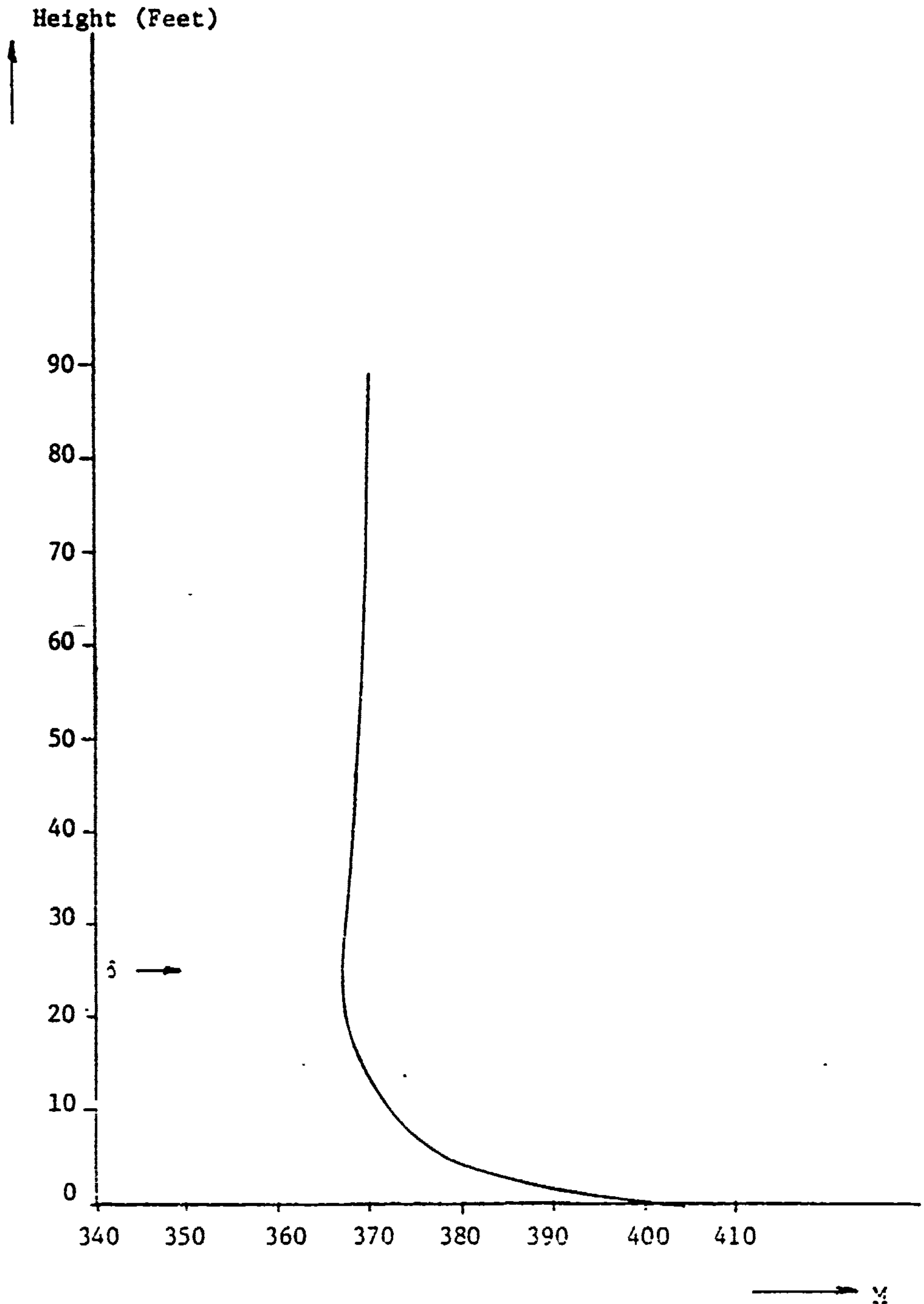
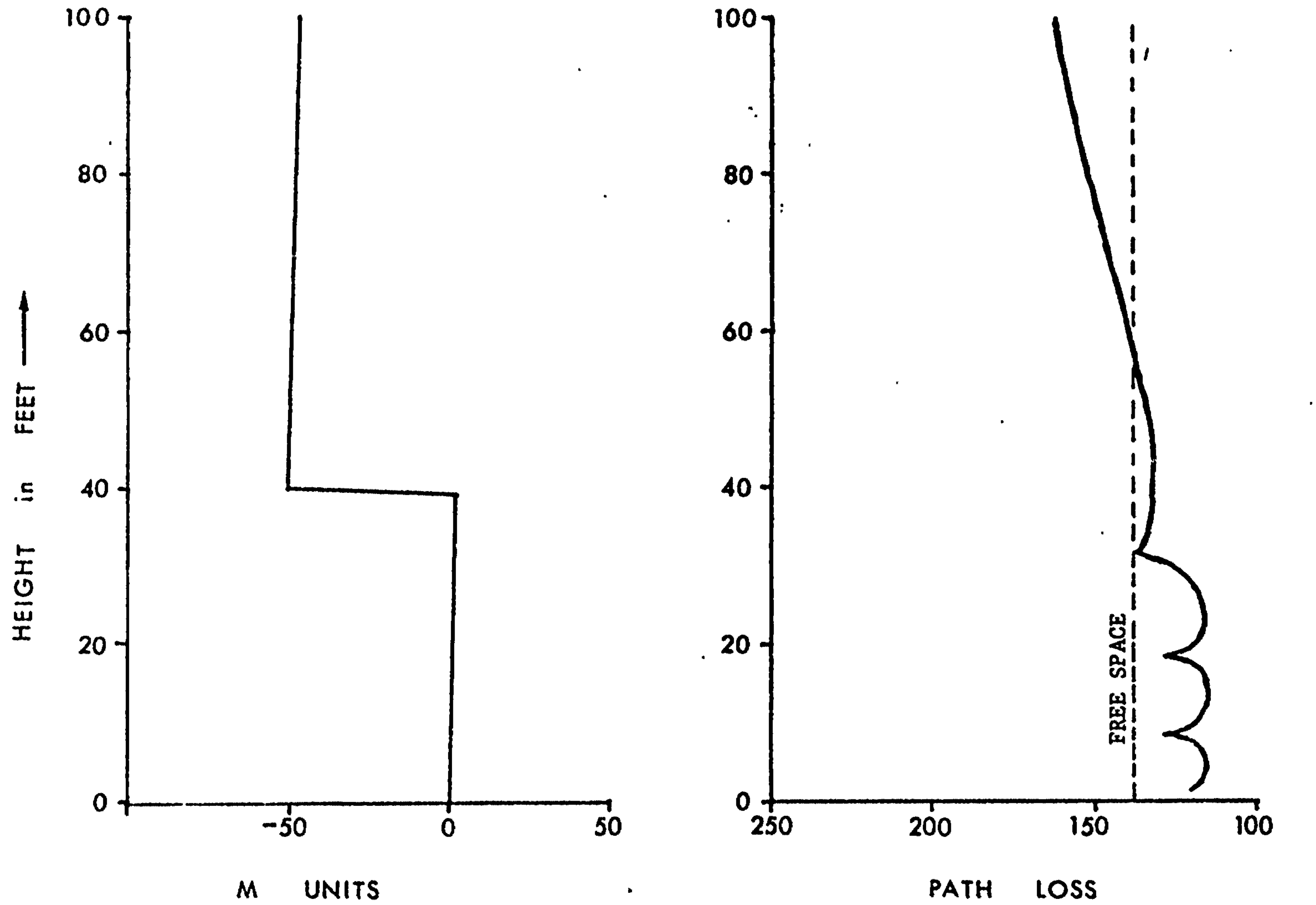


Figure 2. Refractivity profile used to calculate the path loss versus height profile of figure 1 (from figure 167 reference 2).



FREQUENCY: 5850 MHz
PATH LENGTH: 17 NAUTICAL MILES
TRANSMITTER HEIGHT: 5 FEET

Figure 3. Fictitious M-profile with 50 M-unit change between 39' and 40' and corresponding path loss versus height profile.

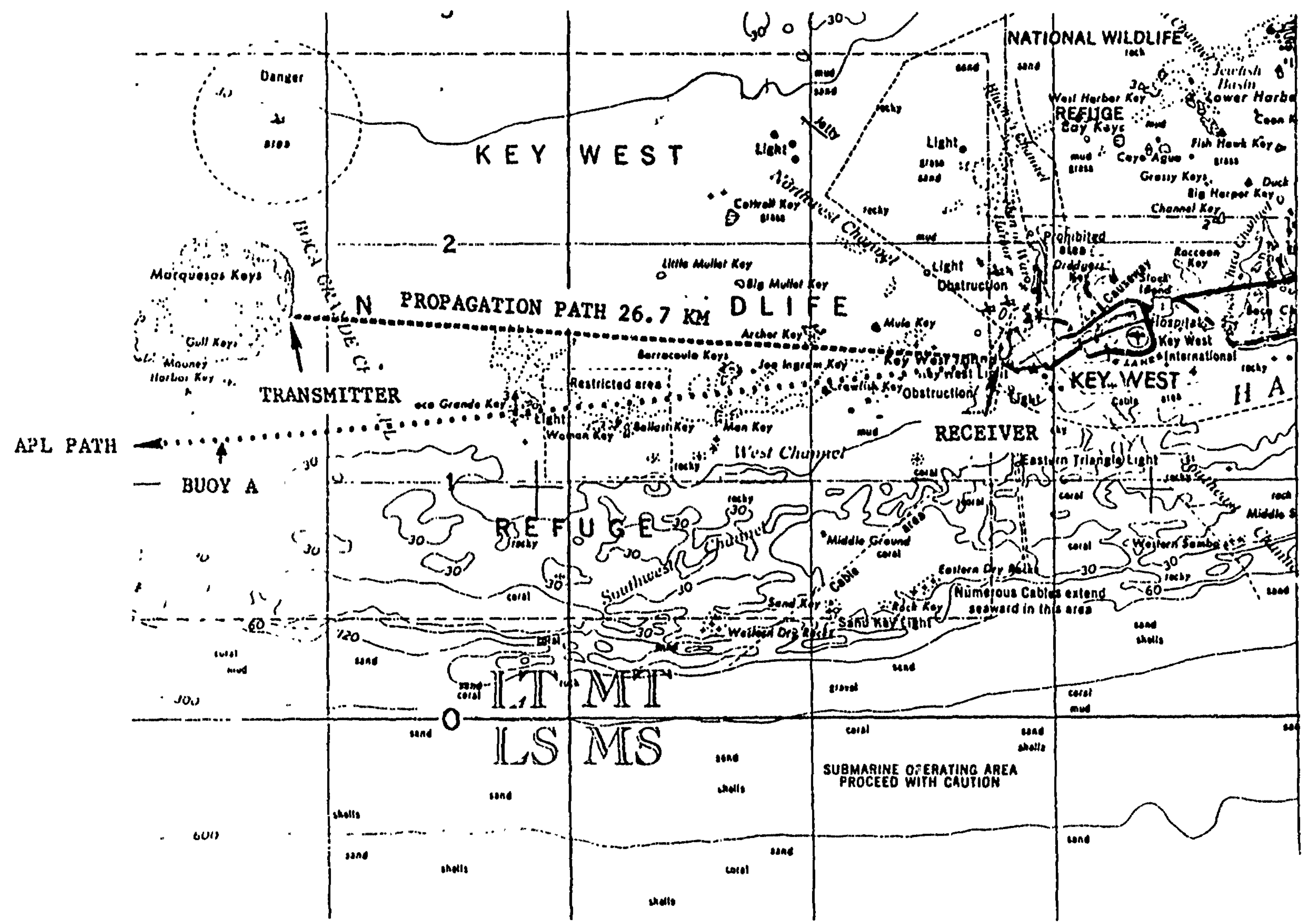


Figure 4. Geographic location of propagation path.

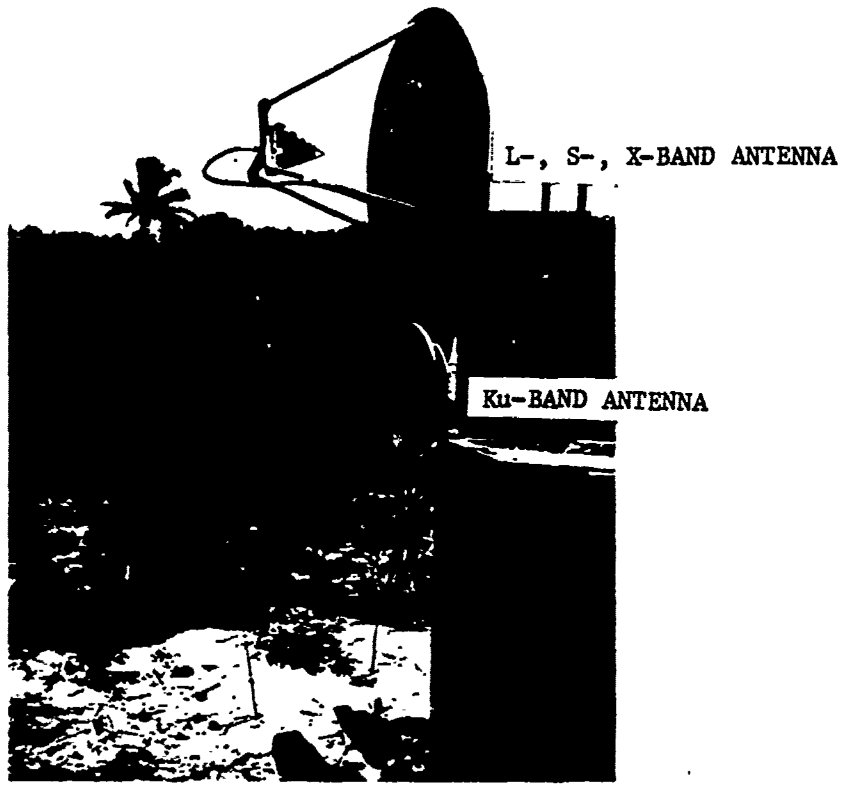


Figure 5. Transmitter on the Marquesa Keys

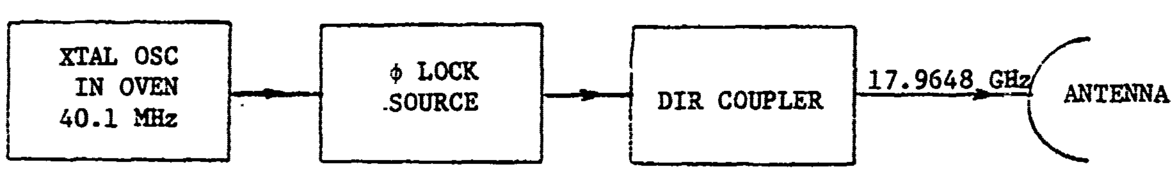


Figure 6. Block diagram of Ku-band transmitter.

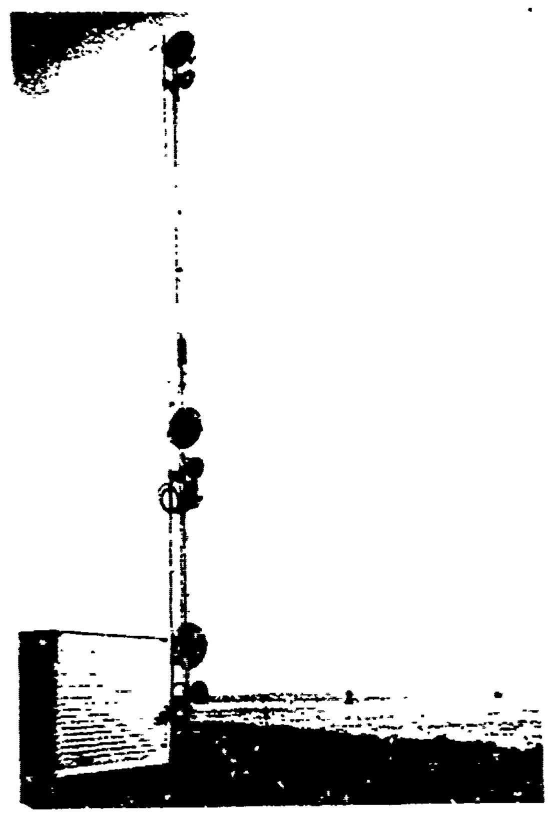


Figure 7. Receiving mast at the Key West Naval Station.

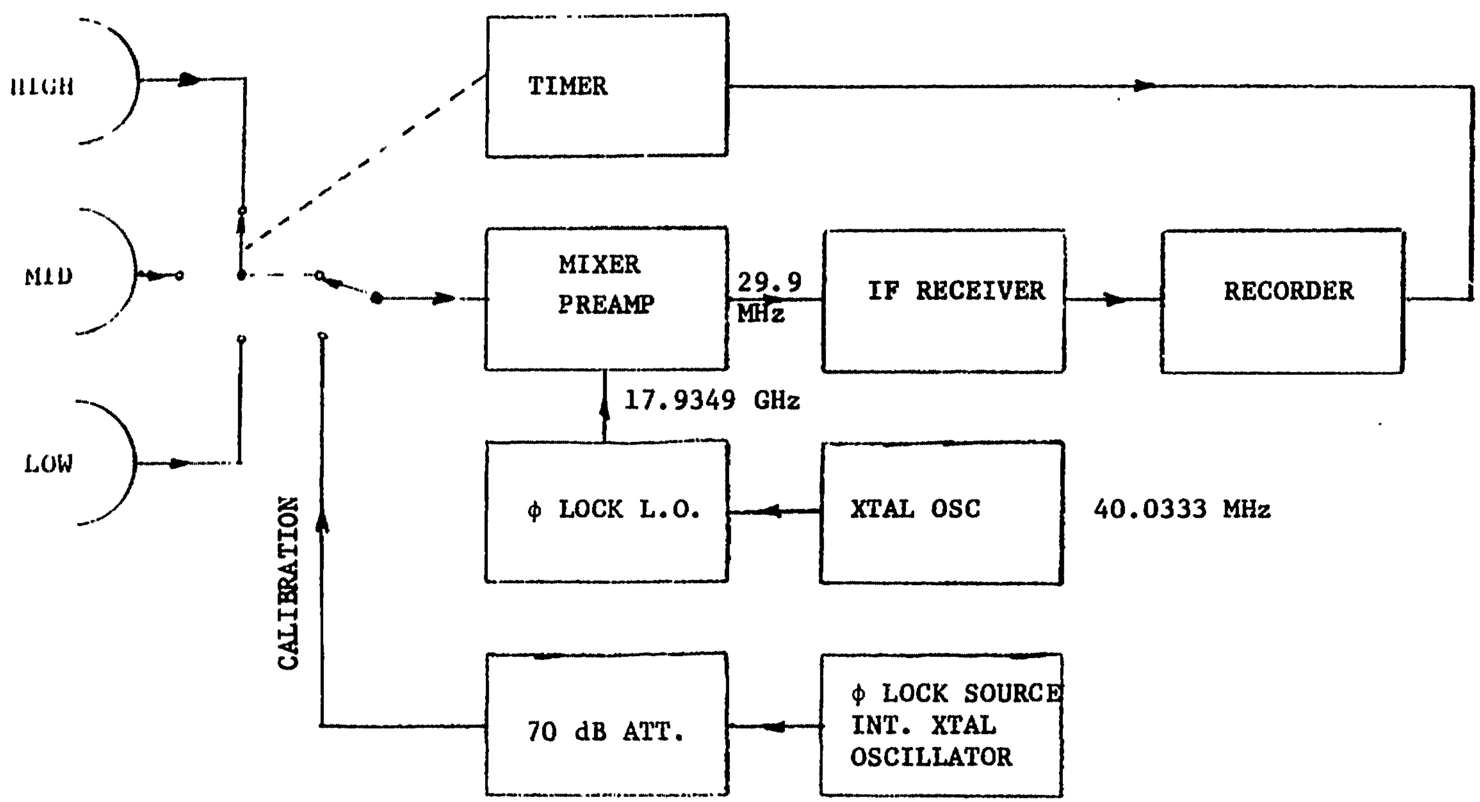


Figure 8. Block diagram of Ku-band receiver.

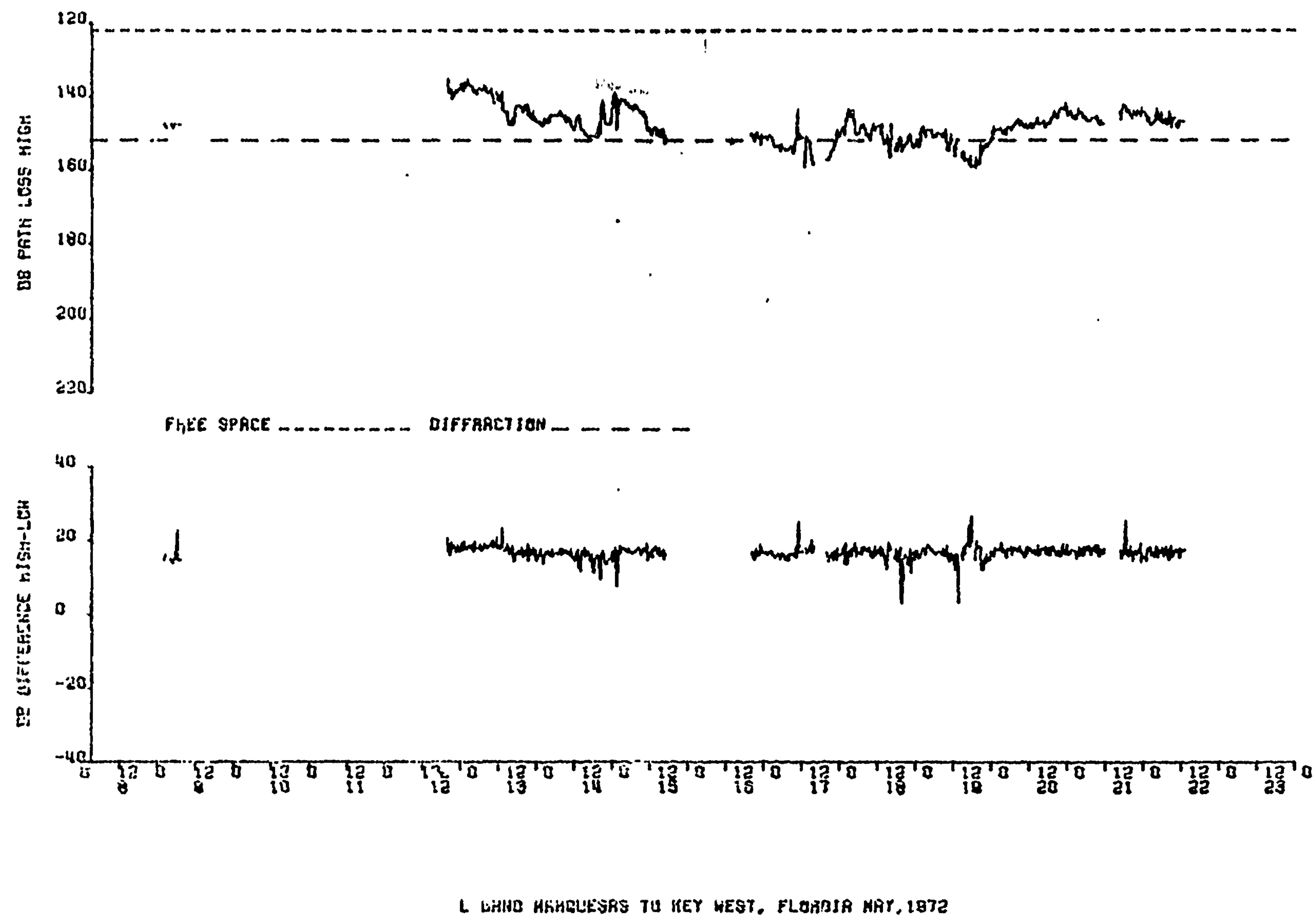
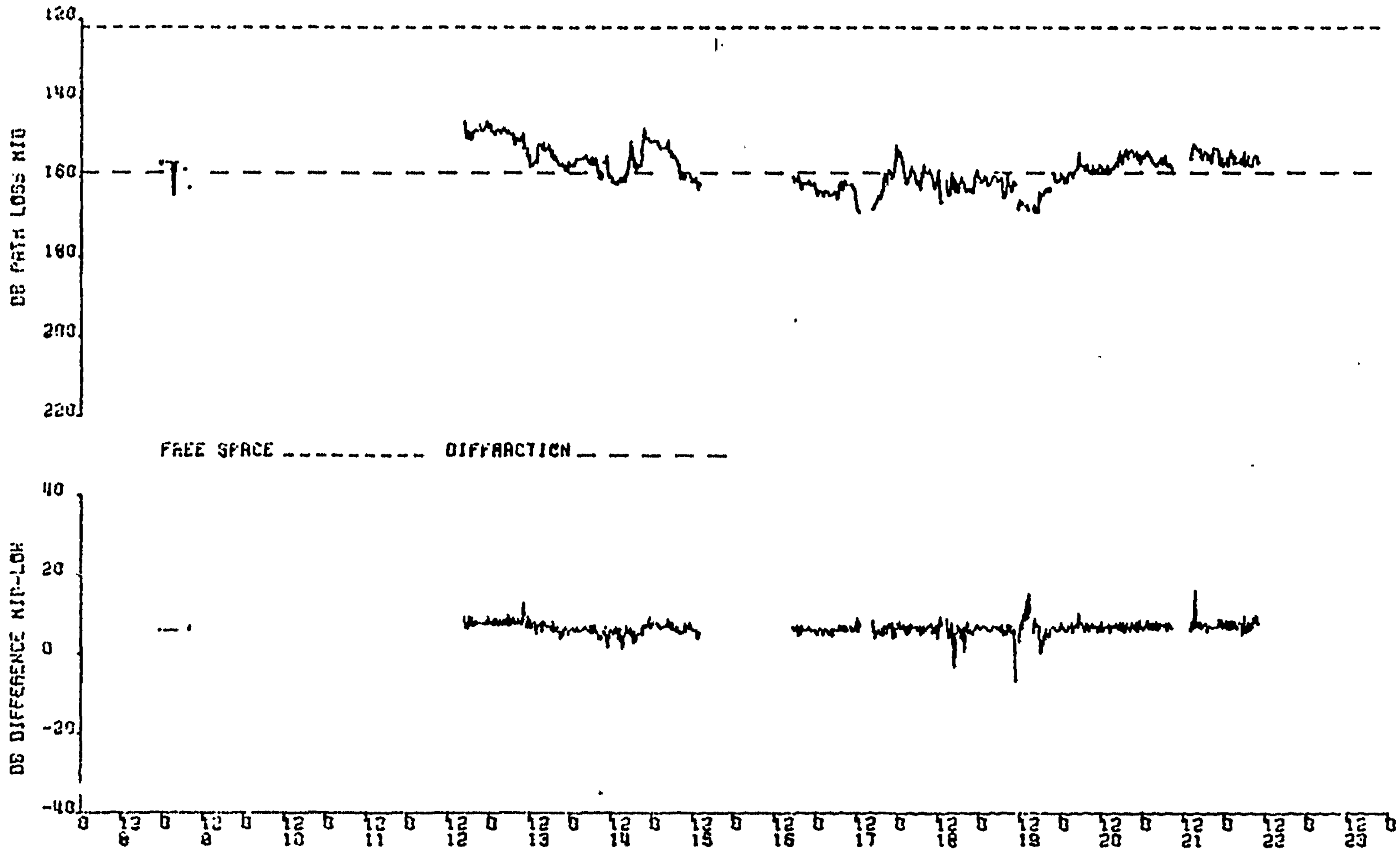
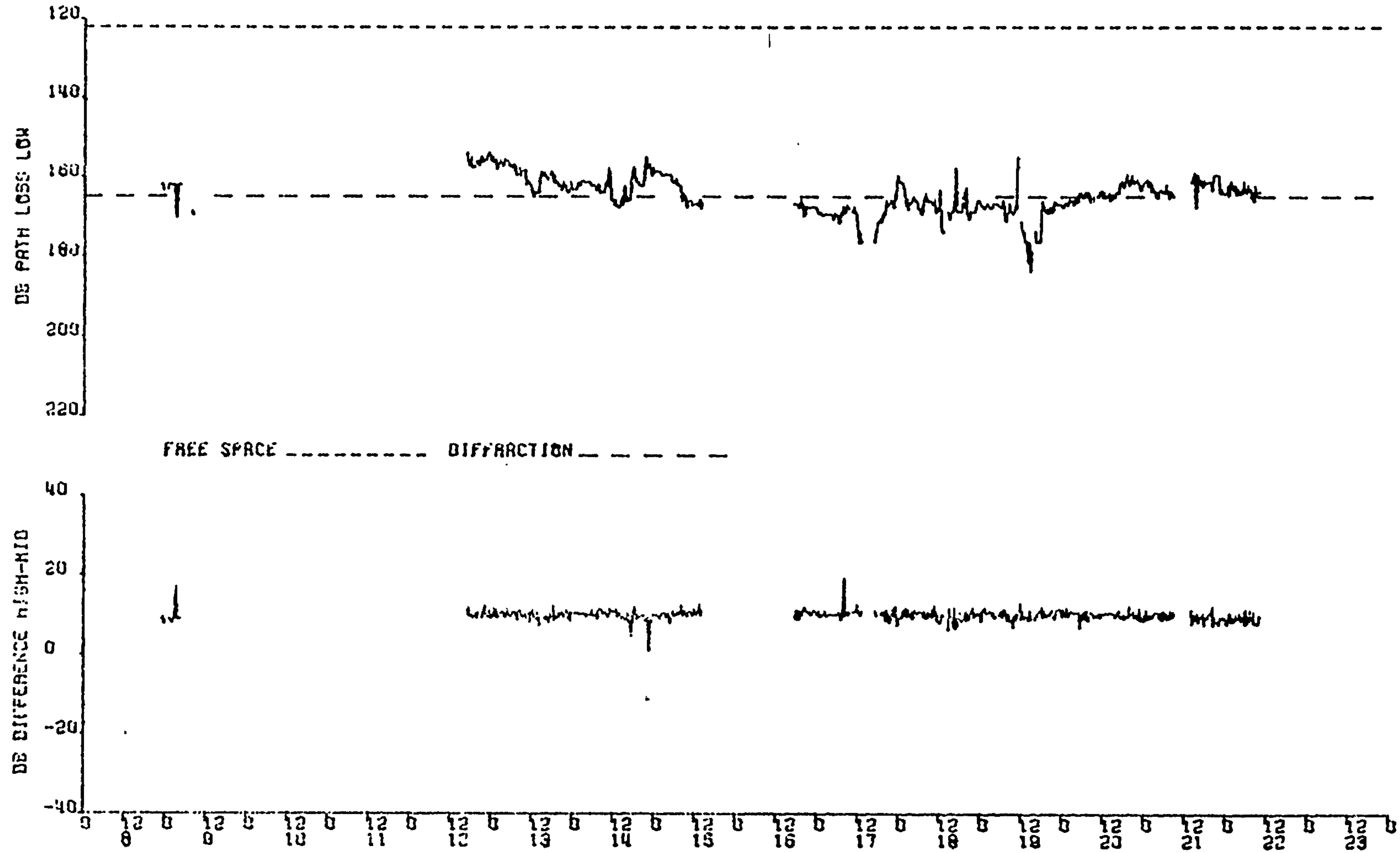


Figure 9. Path loss for high L-band antenna and path loss difference high-low antenna.



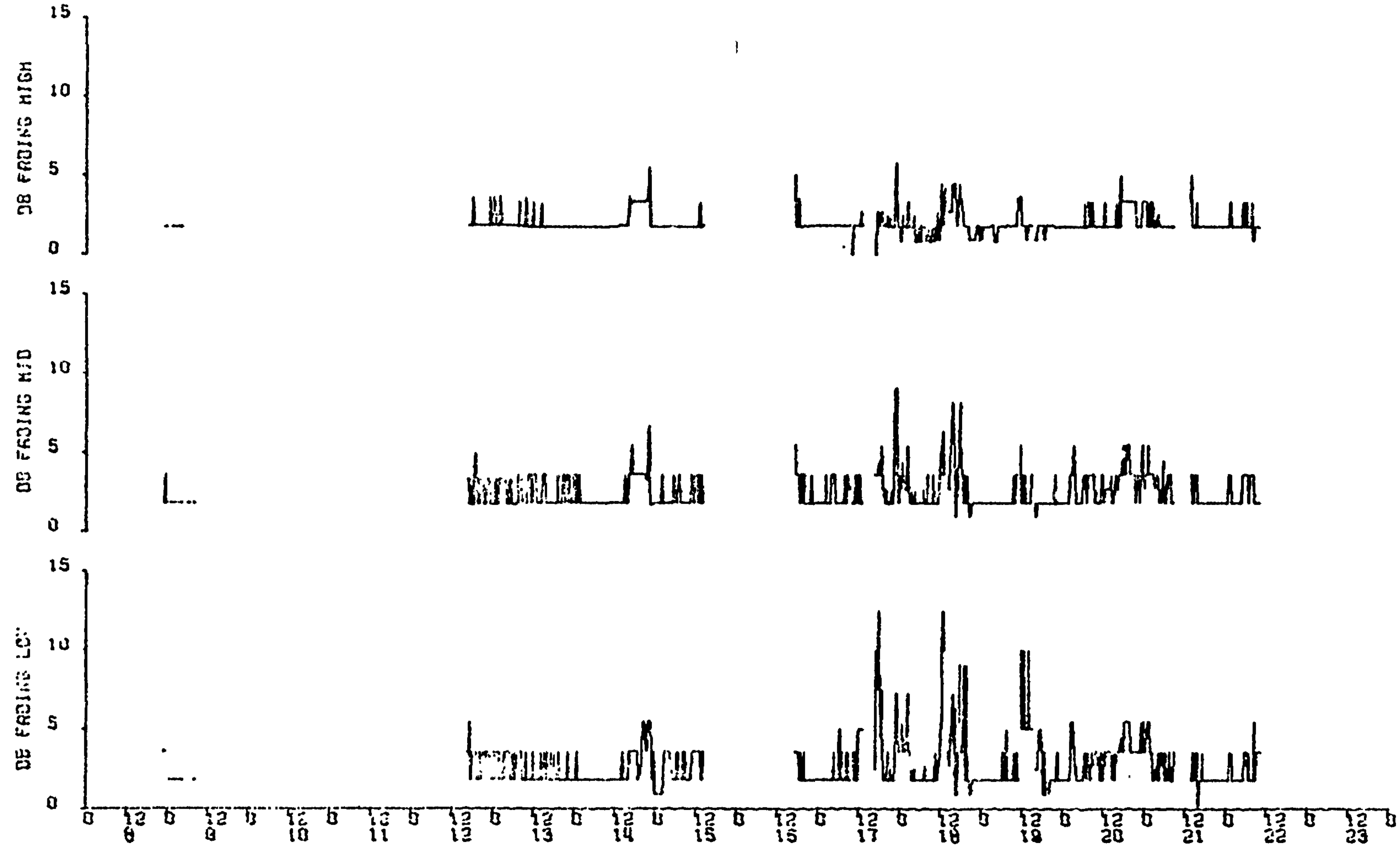
L BAND MARQUESAS TO KEY WEST, FLORIDA MAY,1972

Figure 10. Path loss for middle L-band antenna and path loss difference mid-low antenna.



L BAND MARQUESAS TO KEY WEST, FLORIDA MAY, 1972

Figure 11. Path loss for low L-band antenna and difference high-mid antenna.



L BAND ARAQUESAS TO KEY WEST, FLOADIR MAY,1972

Figure 12. Fading L-band.

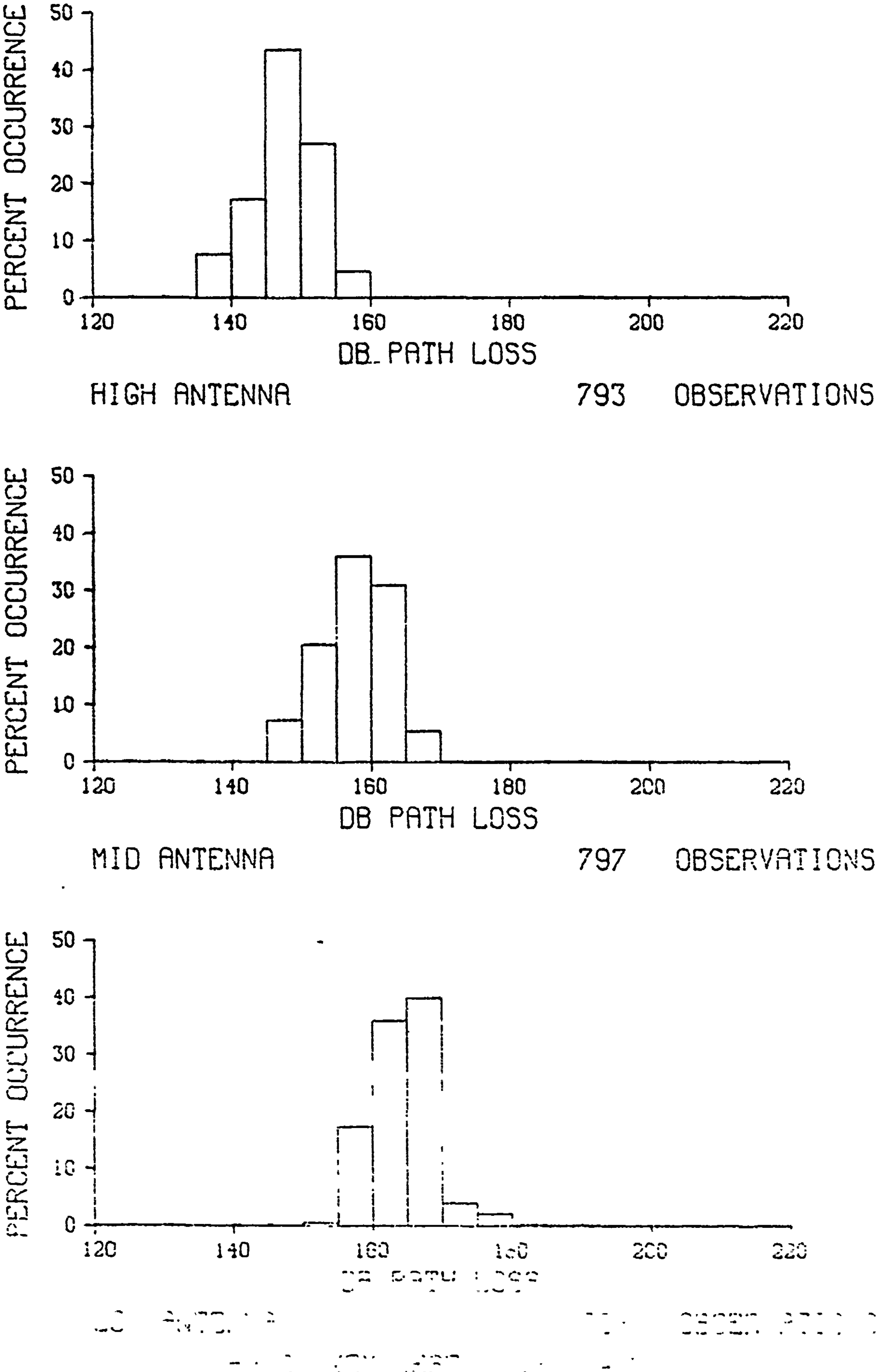


Figure 13. Frequency distributions of path loss for L-band.

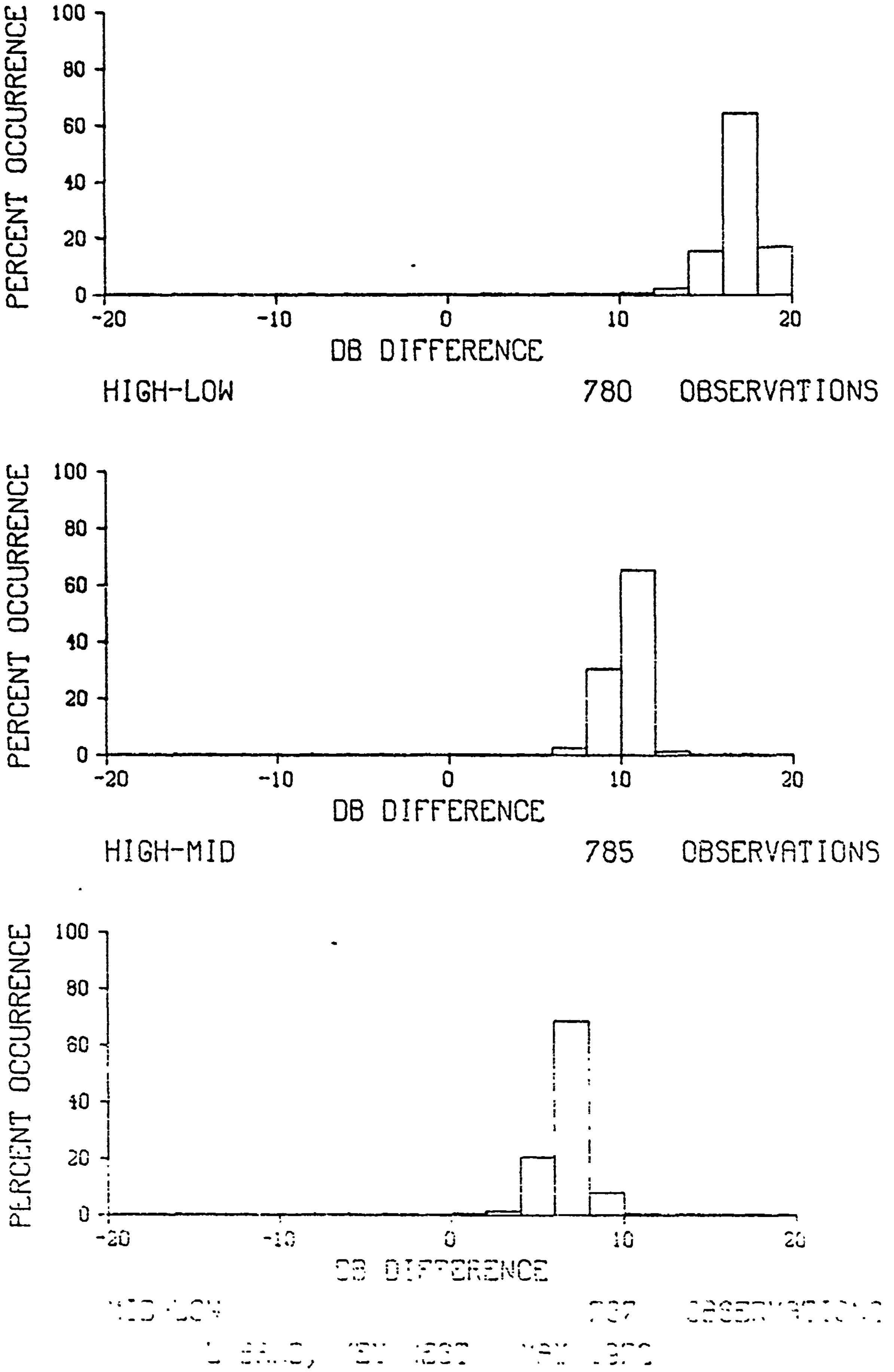


Figure 14. Frequency distributions of path loss differences between antenna for L-band.

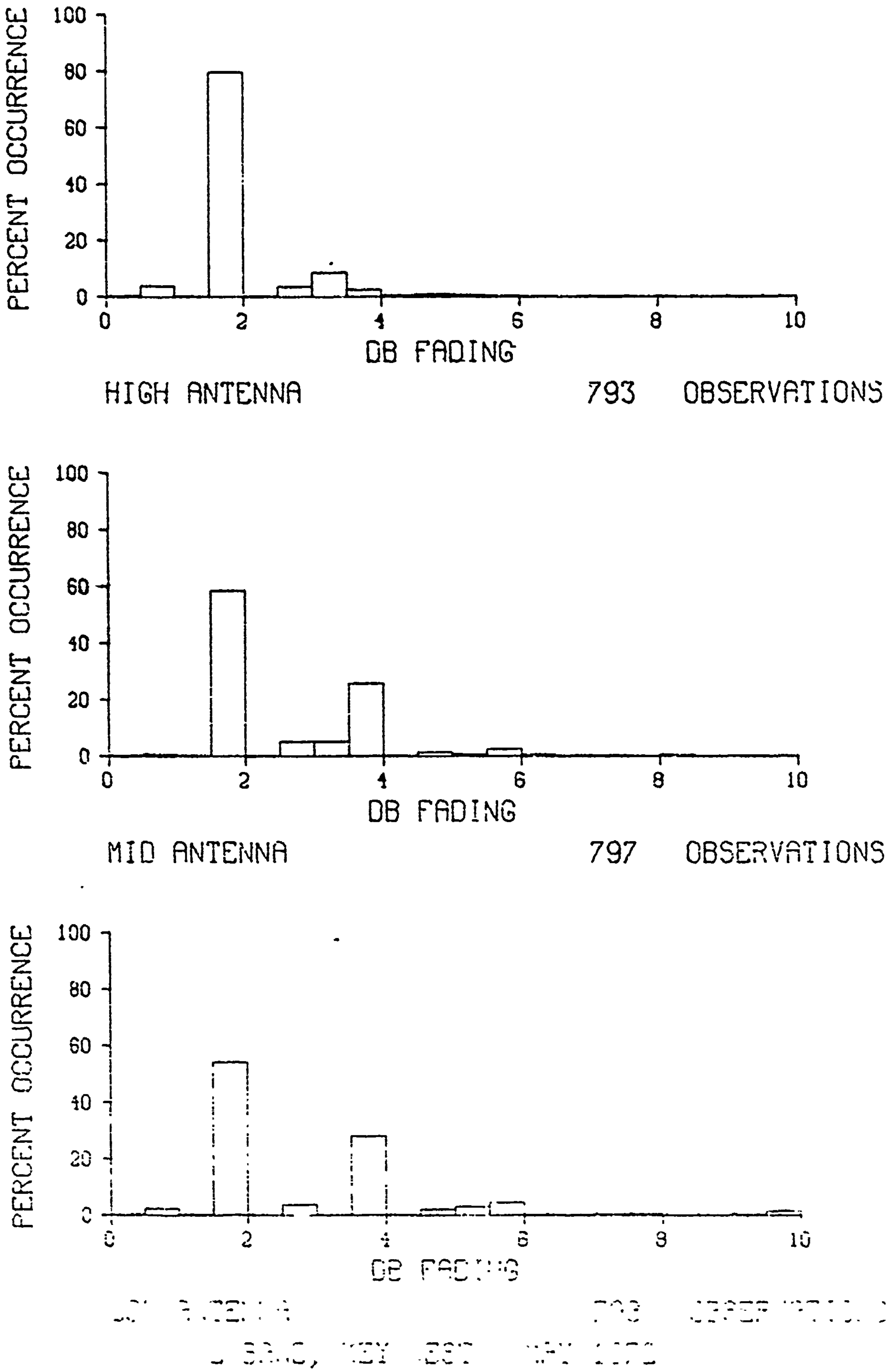
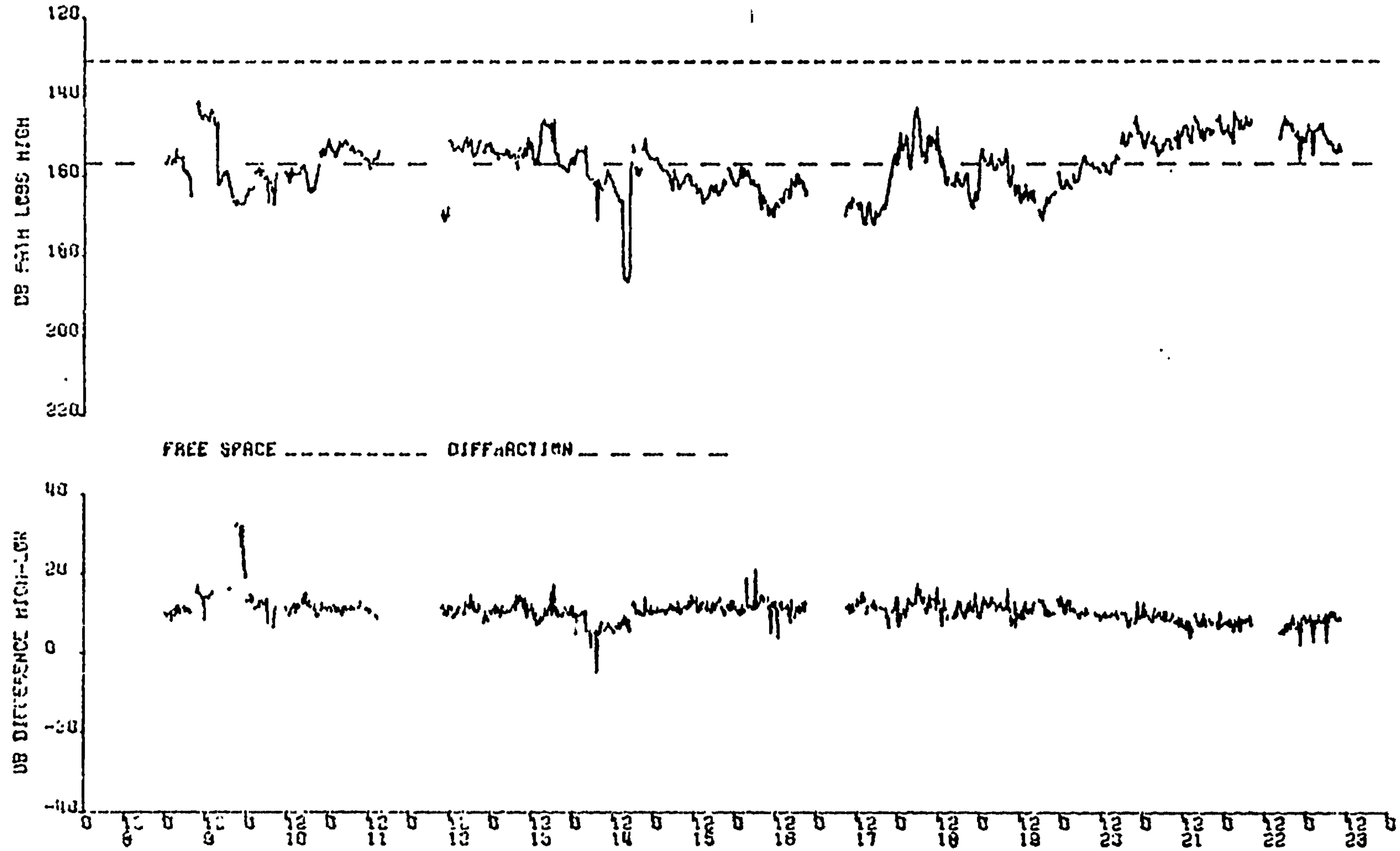
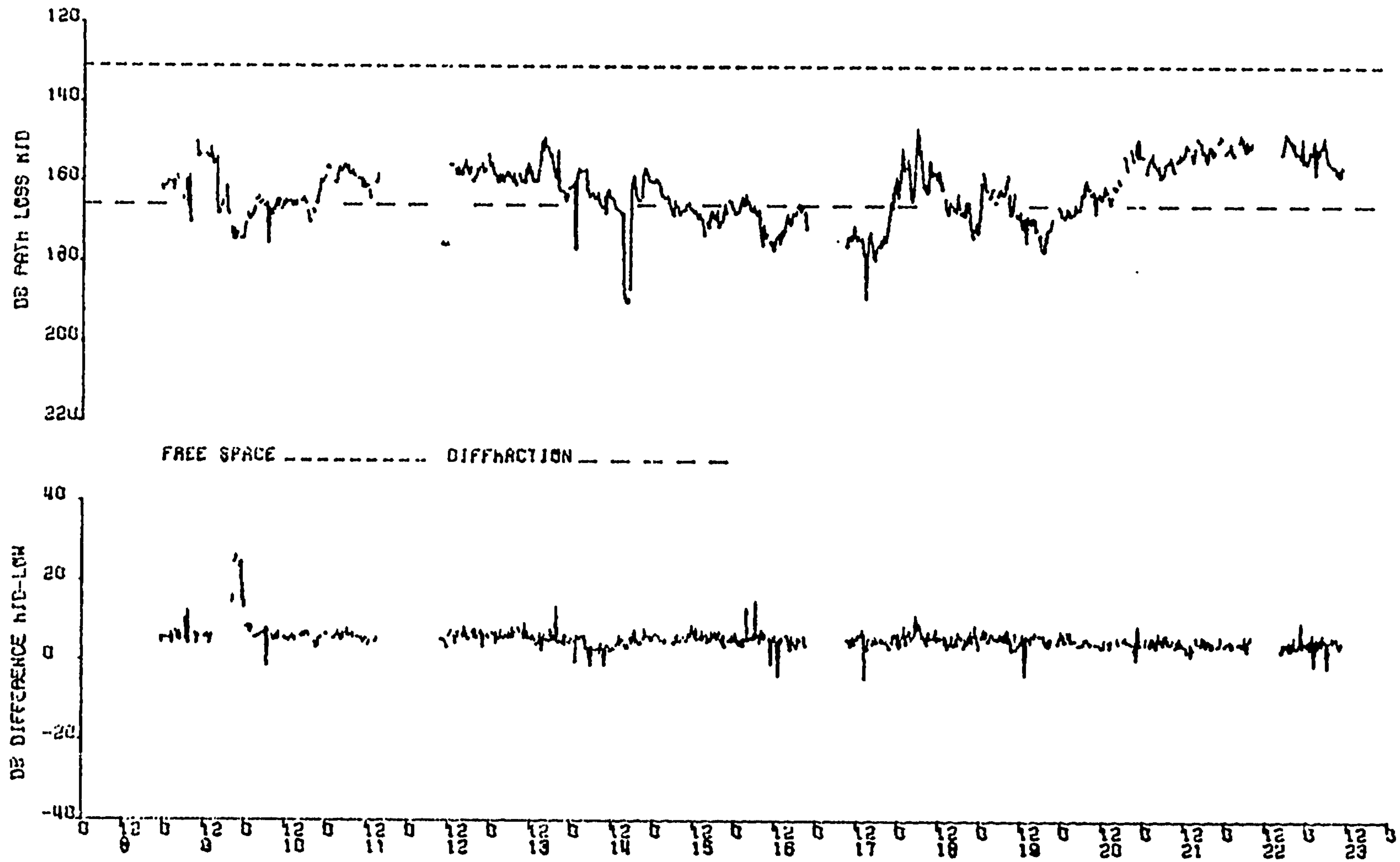


Figure 15. Frequency distribution of fading L-band.



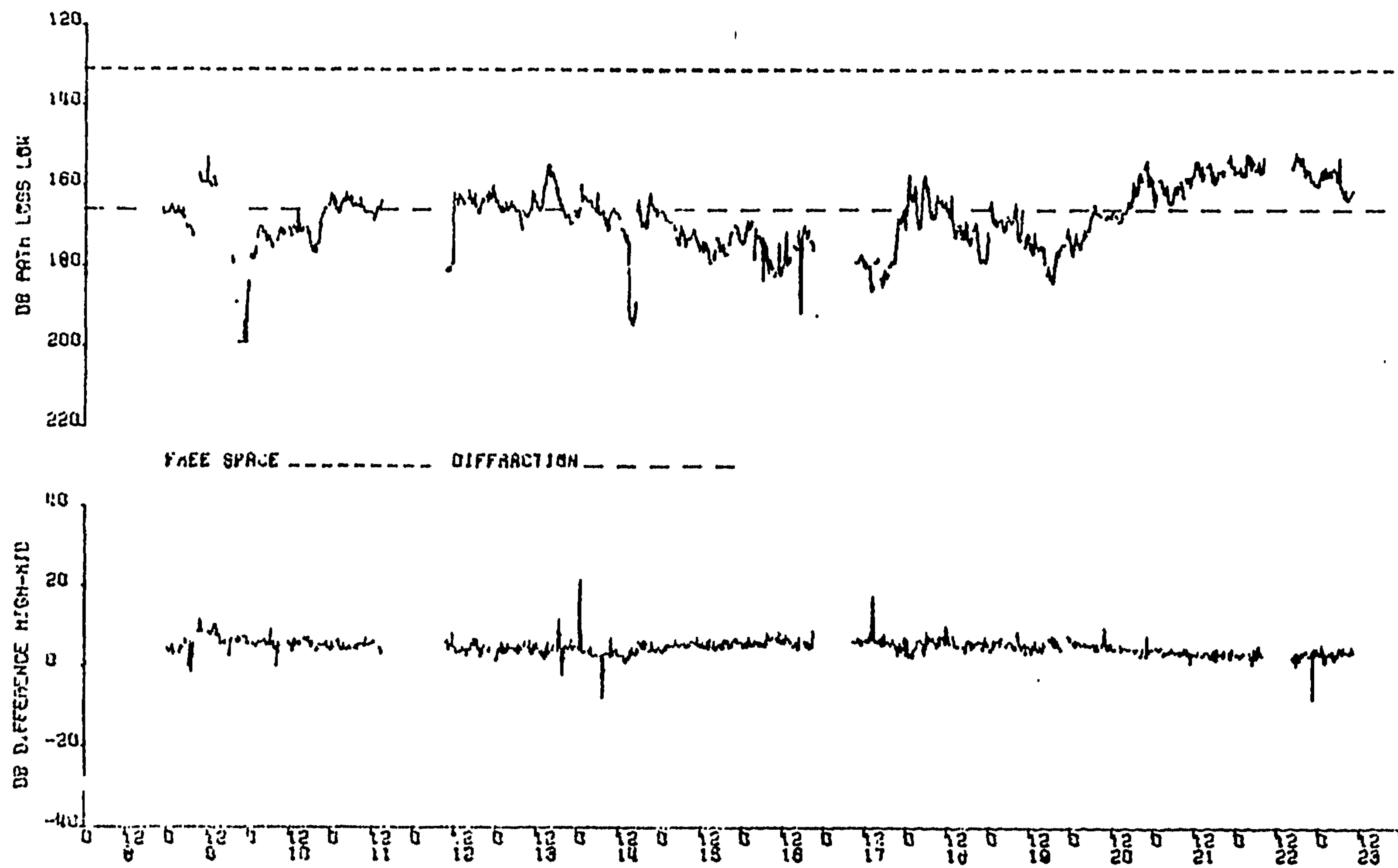
S BAND HAGUESAS TO KEY WEST, FLORCIA MAY,1972

Figure 16. Path loss for high S-band antenna and path loss difference high-low antenna.



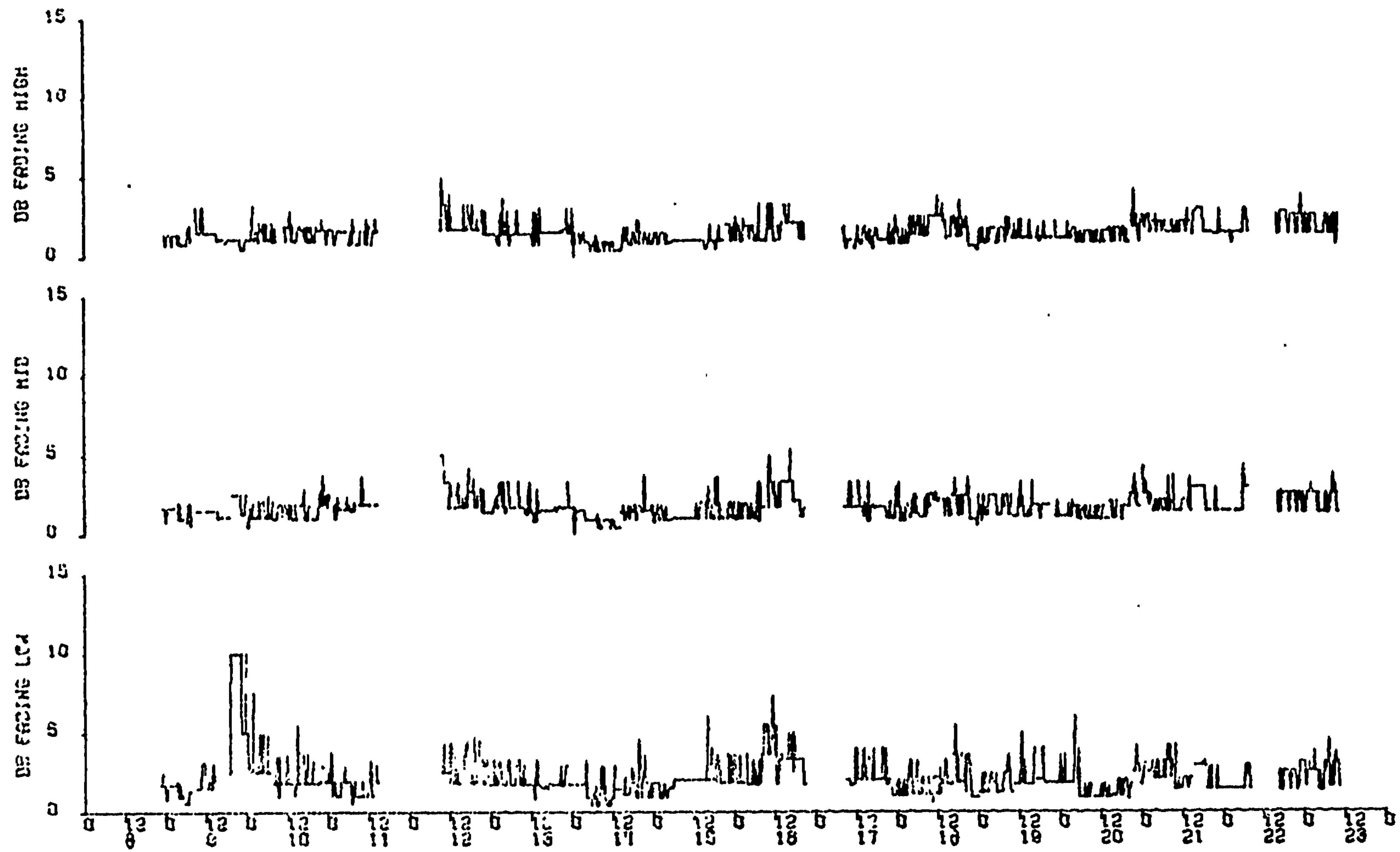
S BAND MARATHON TO KEY WEST, FLORIDA MAY.1972

Figure 17. Path loss for middle S-band antenna and path loss difference mid-low antenna.



S BAND HHAHUEGAS TO KEY WEST, FLORDIA MAY,1972

Figure 18. Path loss for low S-band antenna and path loss difference high-mid antenna.



S BAND MARQUESAS TO KEY WEST, FLORIDA MAY, 1972

Figure 19. Fading S-band.

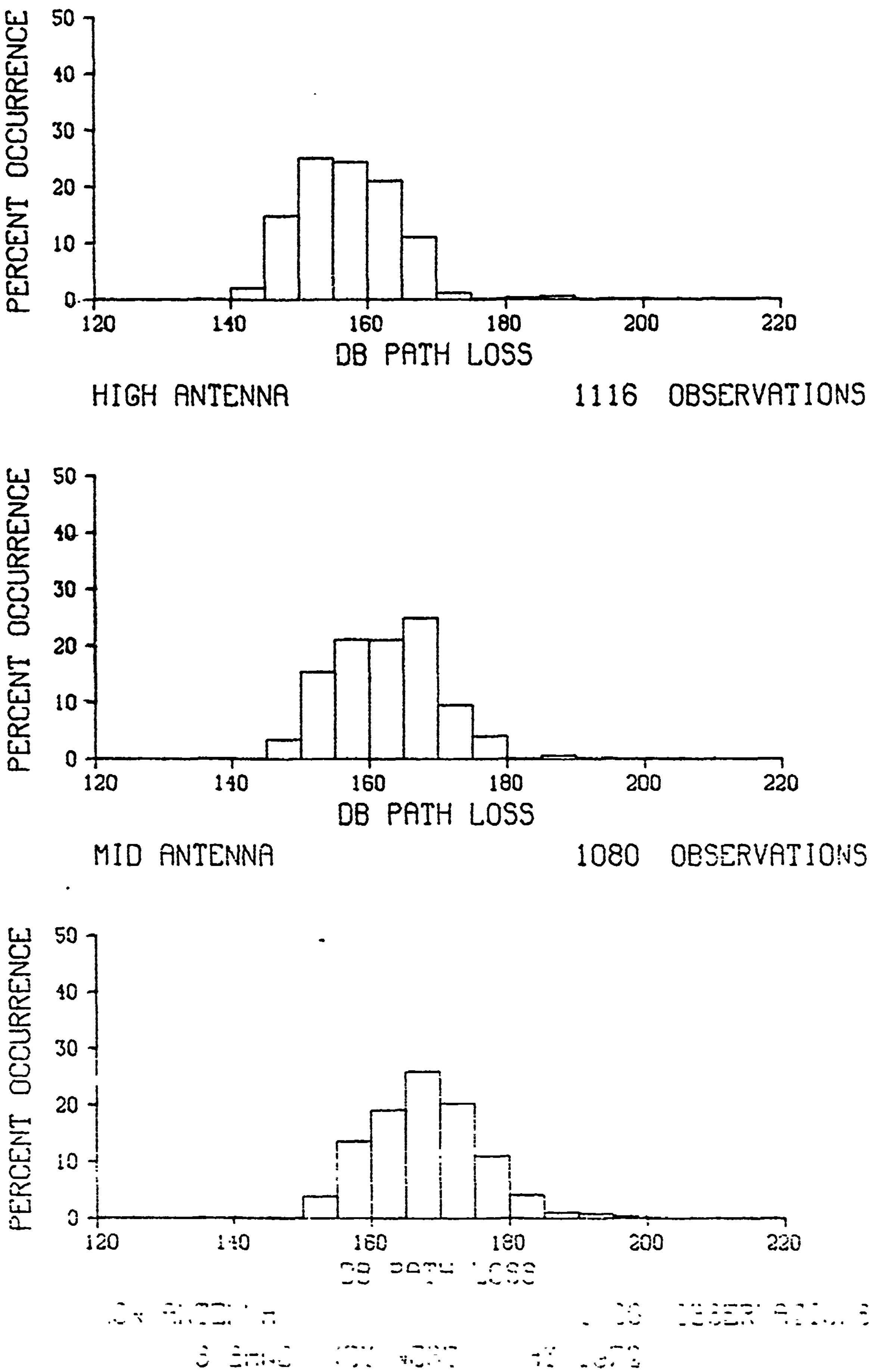


Figure 20. Frequency distributions of path loss for S-band.

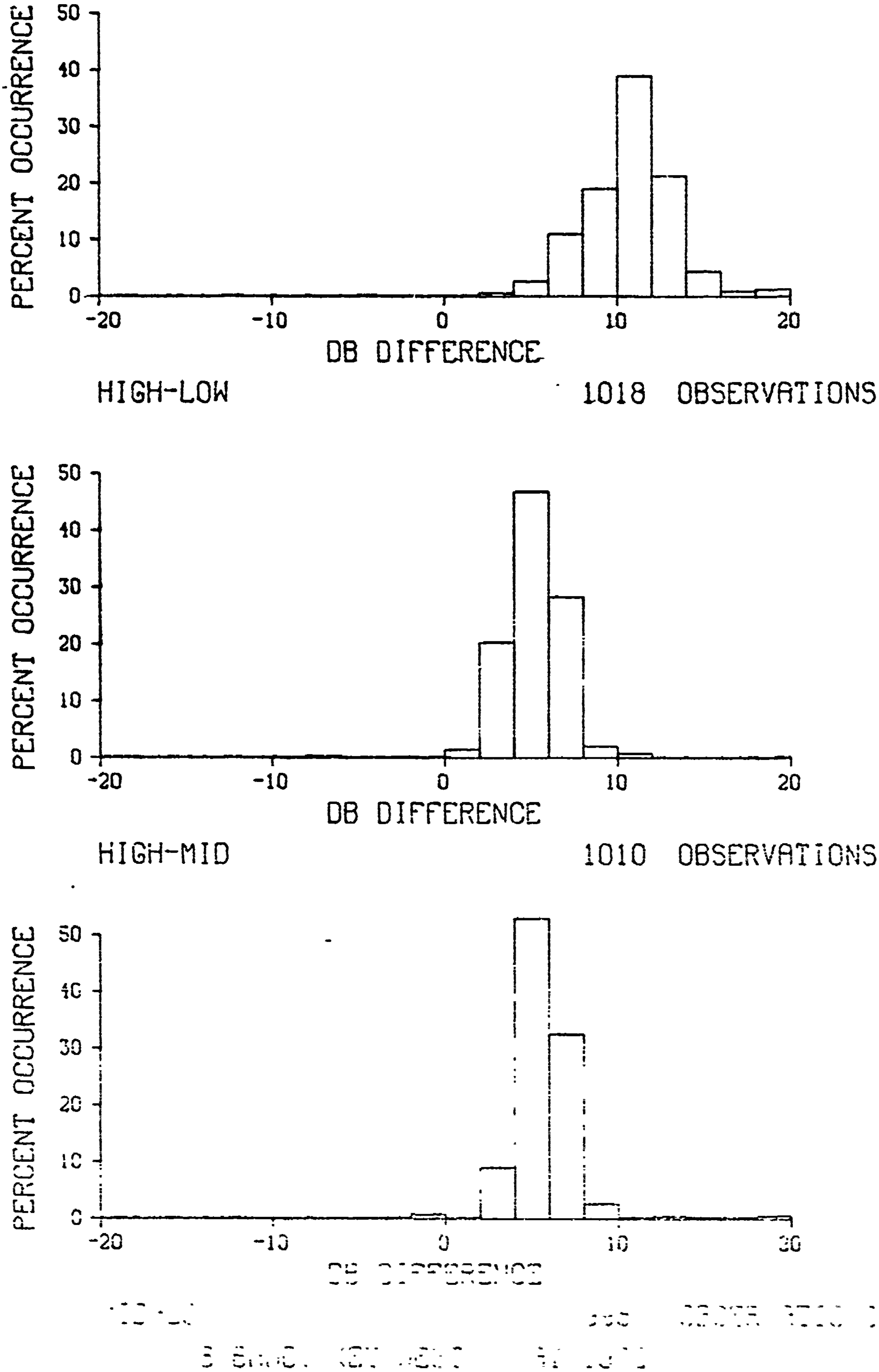


Figure 21. Frequency distributions of path loss differences between antennas for S-band.

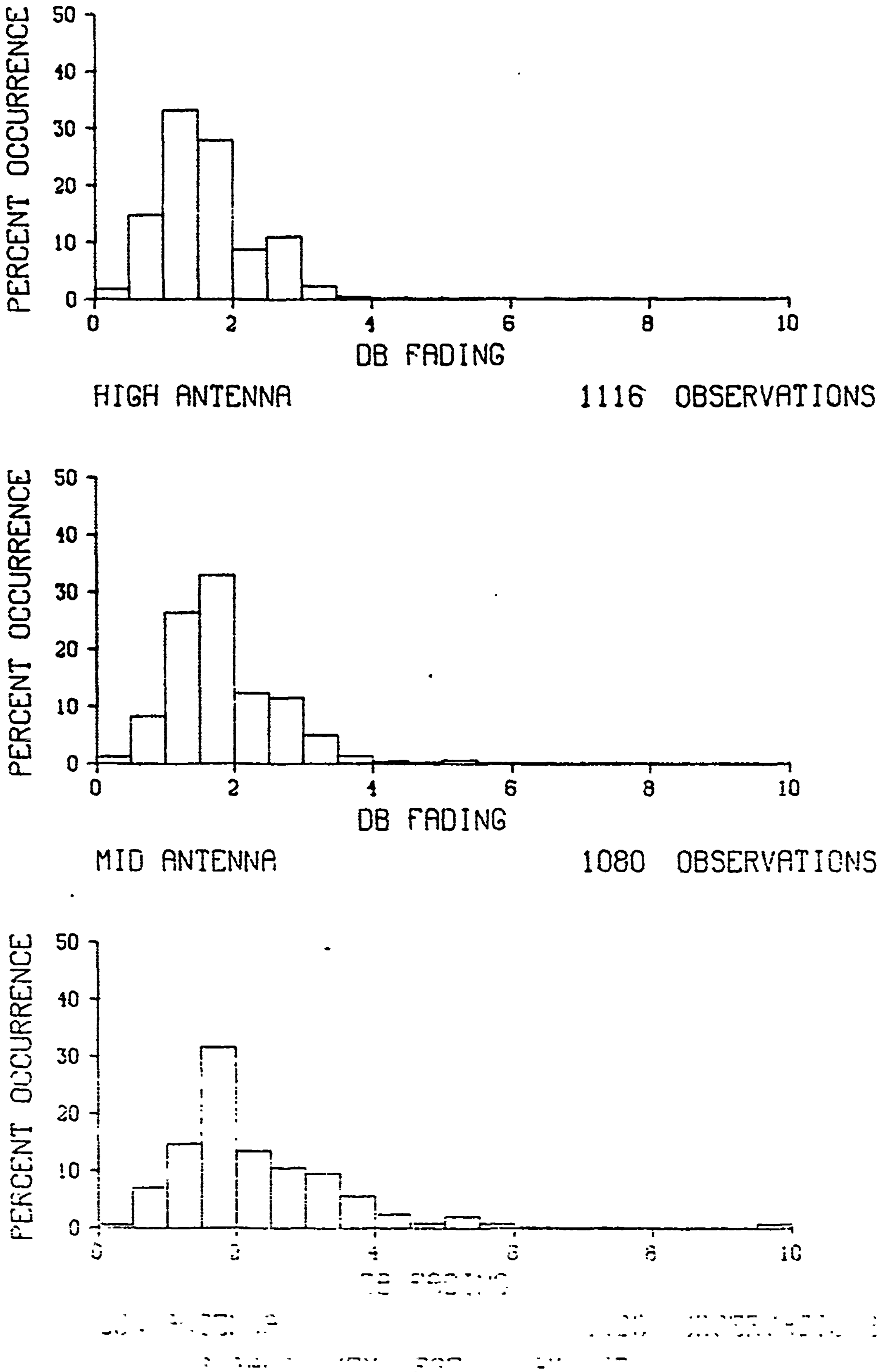
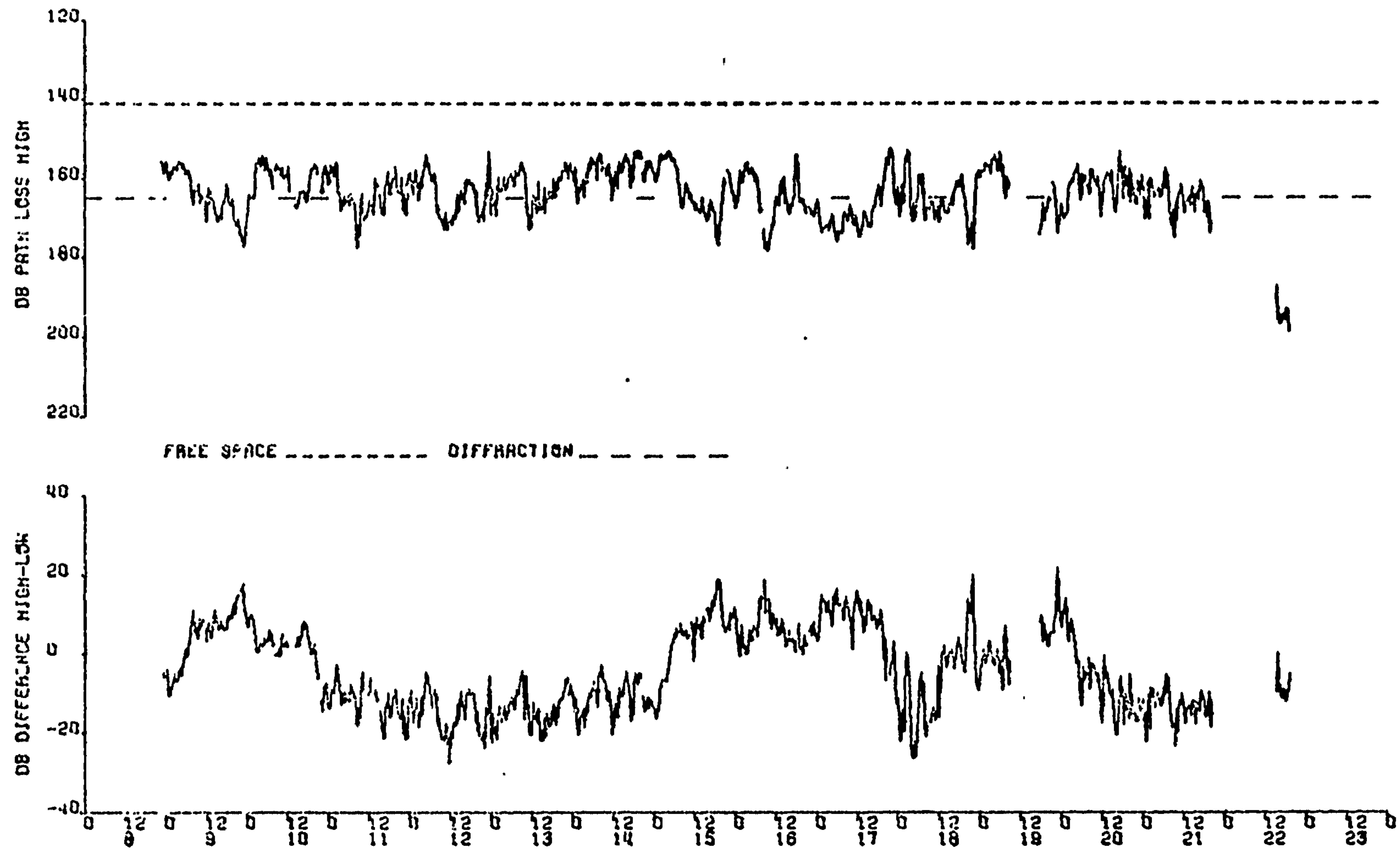
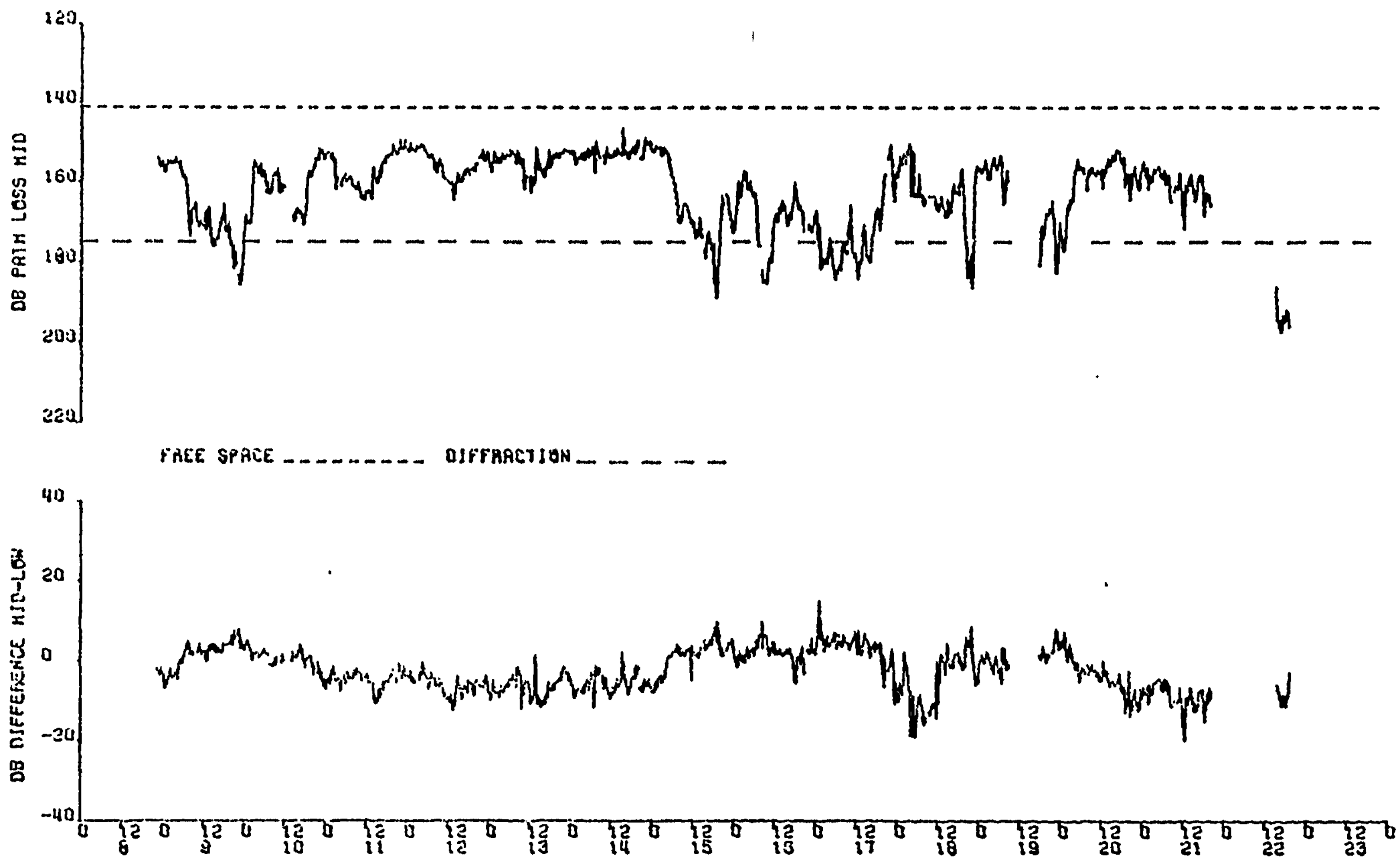


Figure 22. Frequency distributions of fading for S-band.



X BAND KARQUESAS TO KEY WEST, FLORIDA MAY,1972

Figure 23. Path loss for high X-band antenna and path loss difference high-low antenna.



X BAND MARQUESAS TO KEY WEST, FLORIDA MAY,1972

Figure 24. Path loss for middle X-band antenna and path loss difference mid-low antenna.

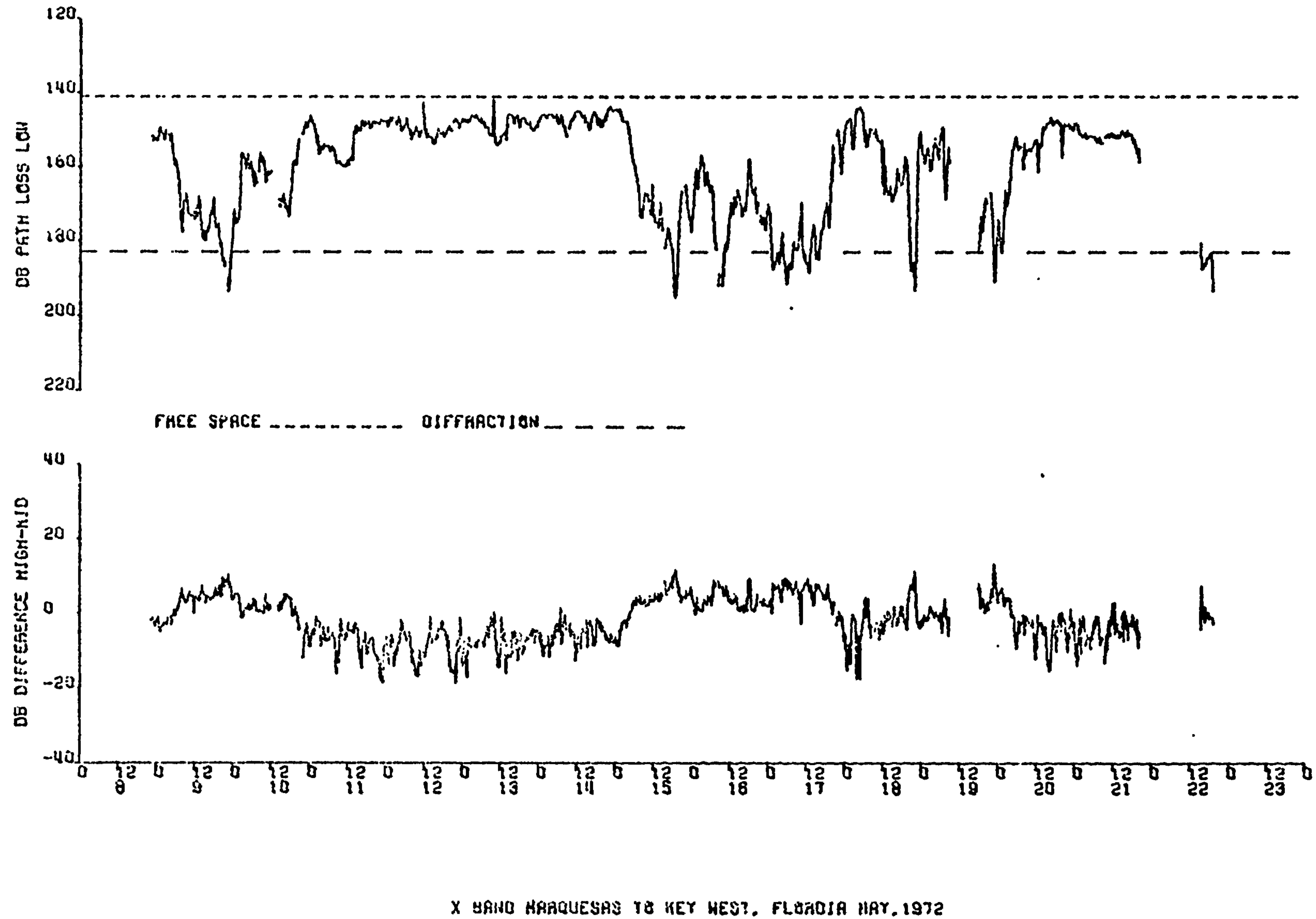
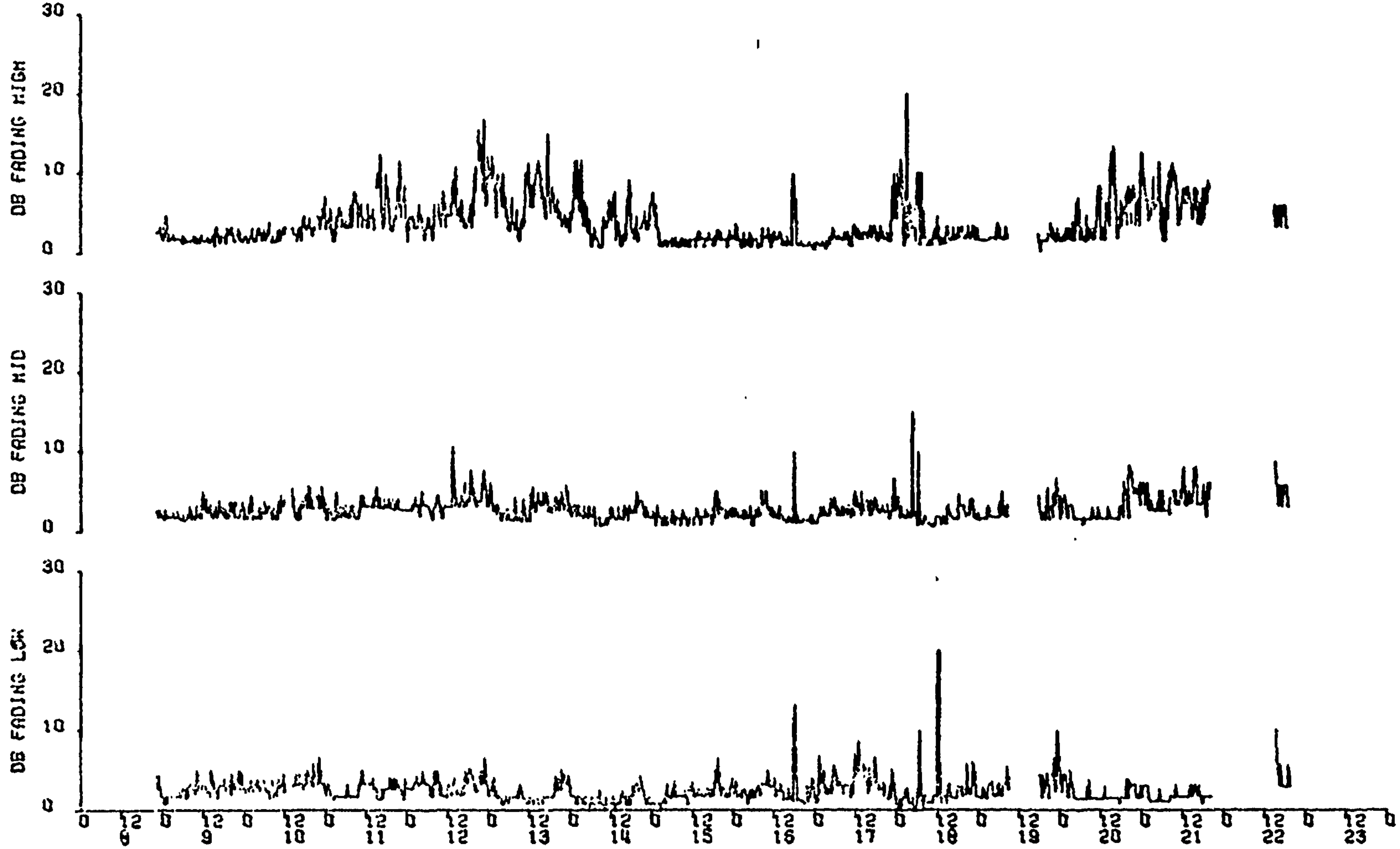


Figure 25. Path loss for low X-band antenna and path loss difference high-mid antenna.



X BAND MARQUESAS TO KEY WEST, FLORIDA MAY,1972
Figure 26. Fading X-band.

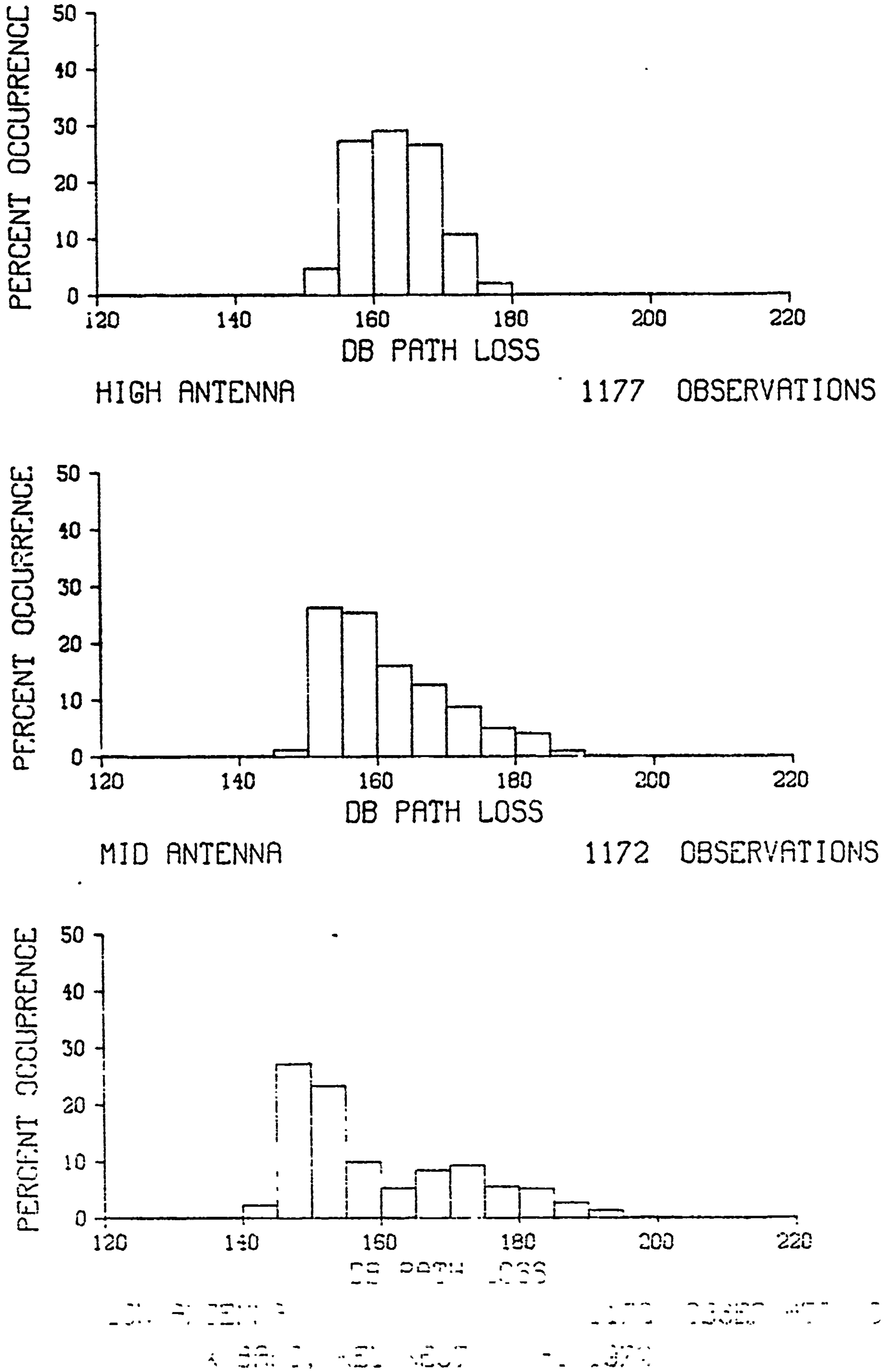


Figure 27. Frequency distributions of path loss for X-band.

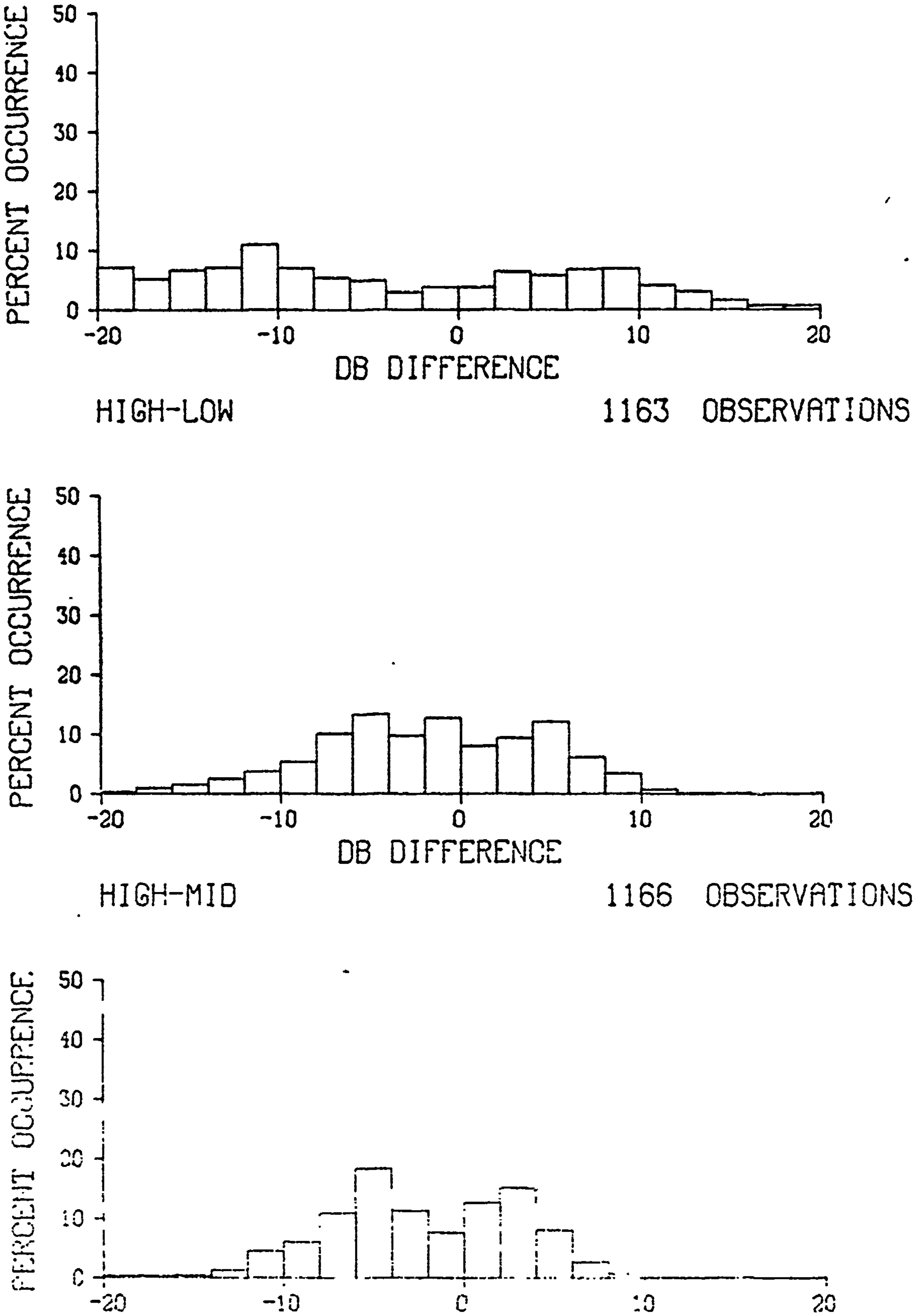


Figure 28. Frequency distributions of path loss differences between antennas for X-band.

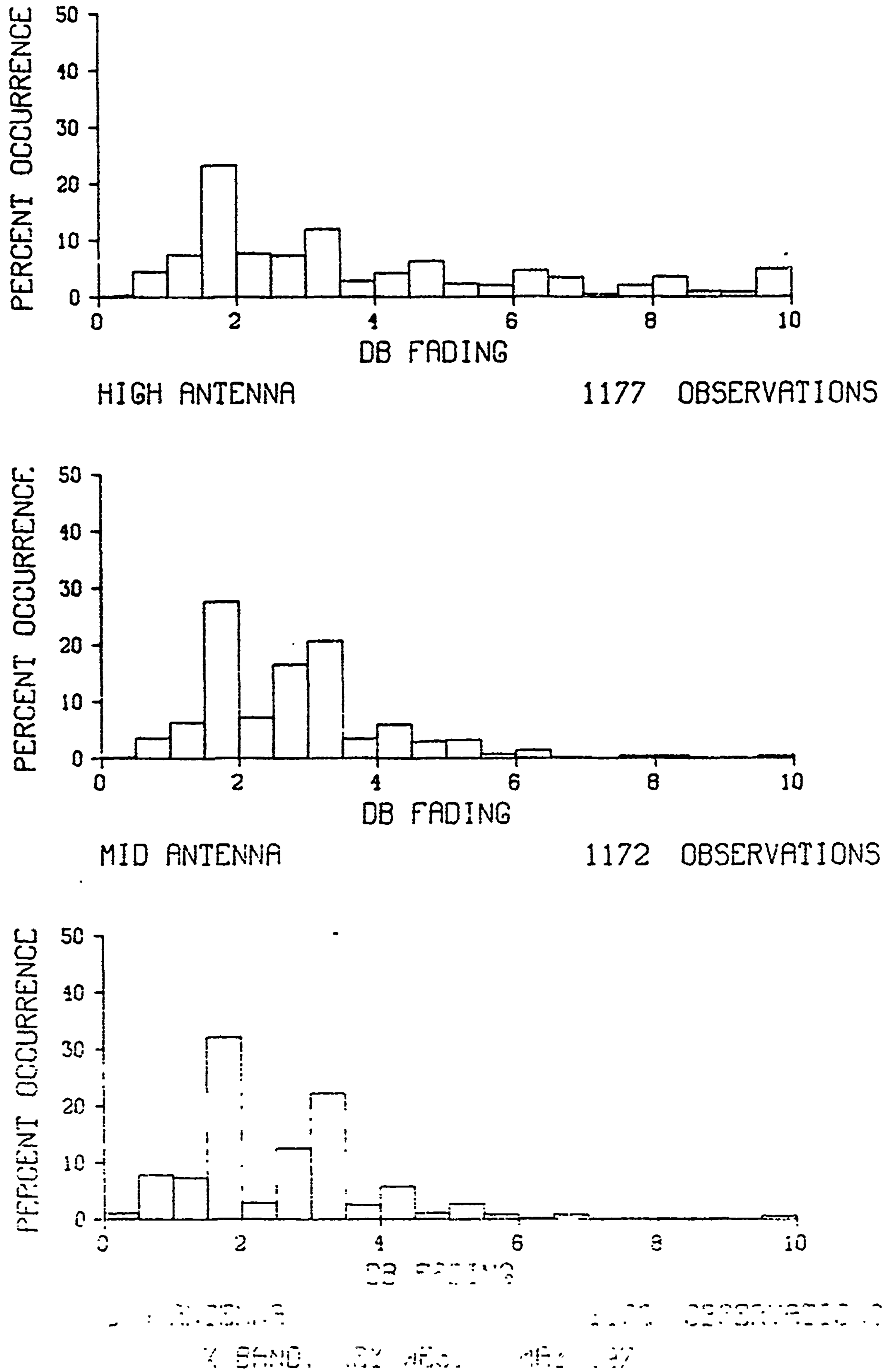
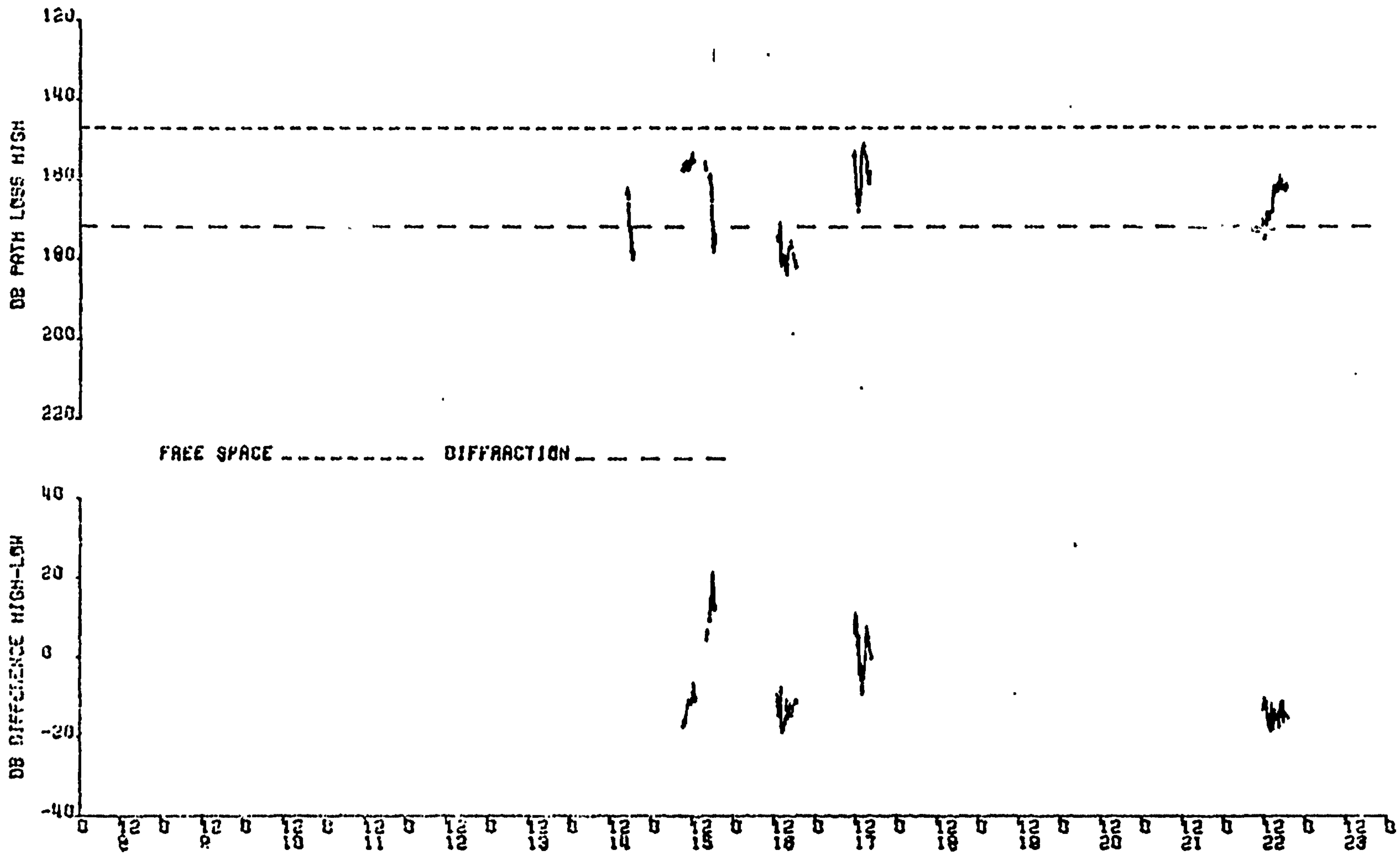


Figure 29. Frequency distributions of fading for X-band.



KU BAND MARQUESAS TO KEY WEST, FLORIDA MAY, 1972

Figure 30. Path loss for high Ku-band antenna and path loss difference high-low antenna.

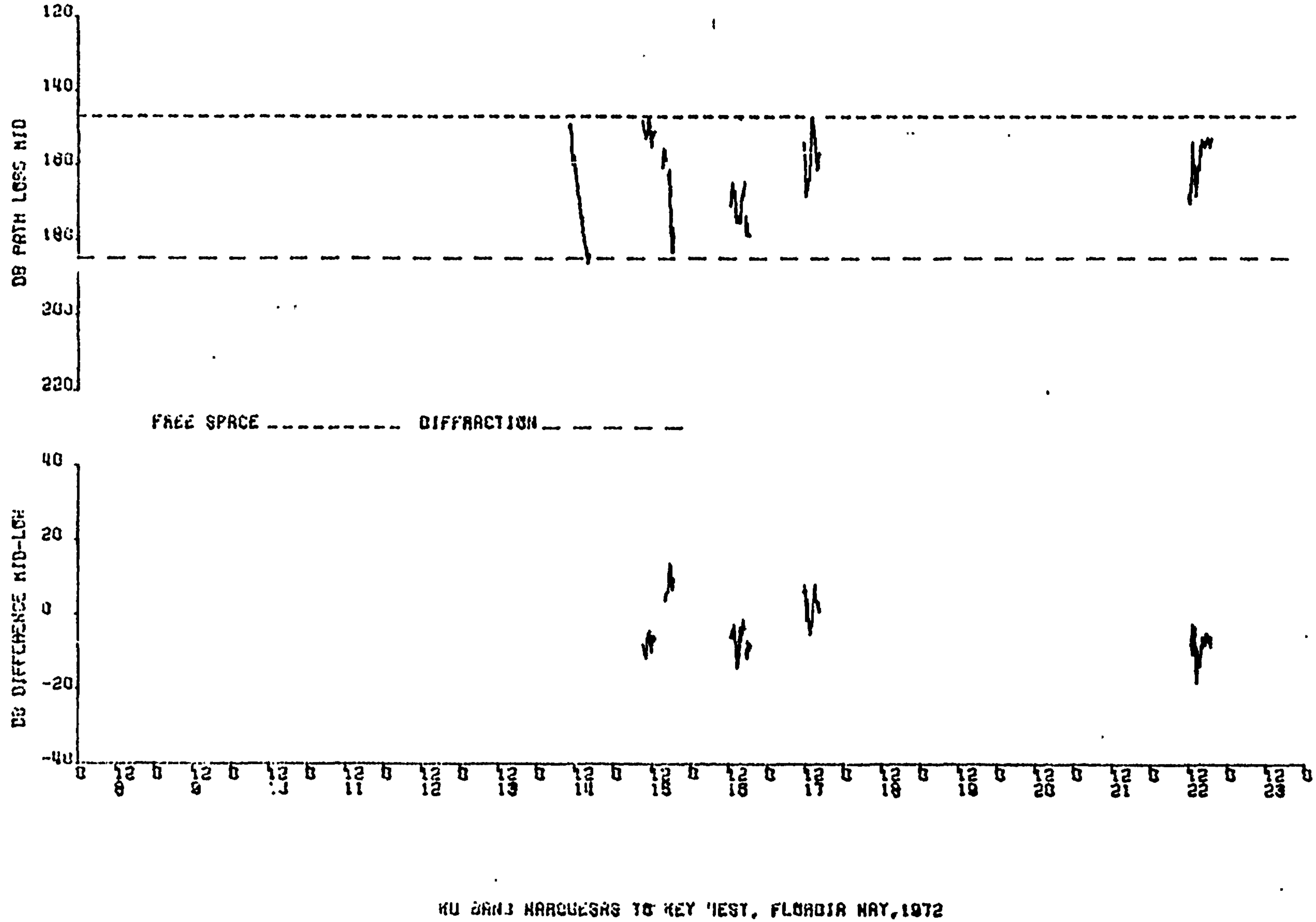
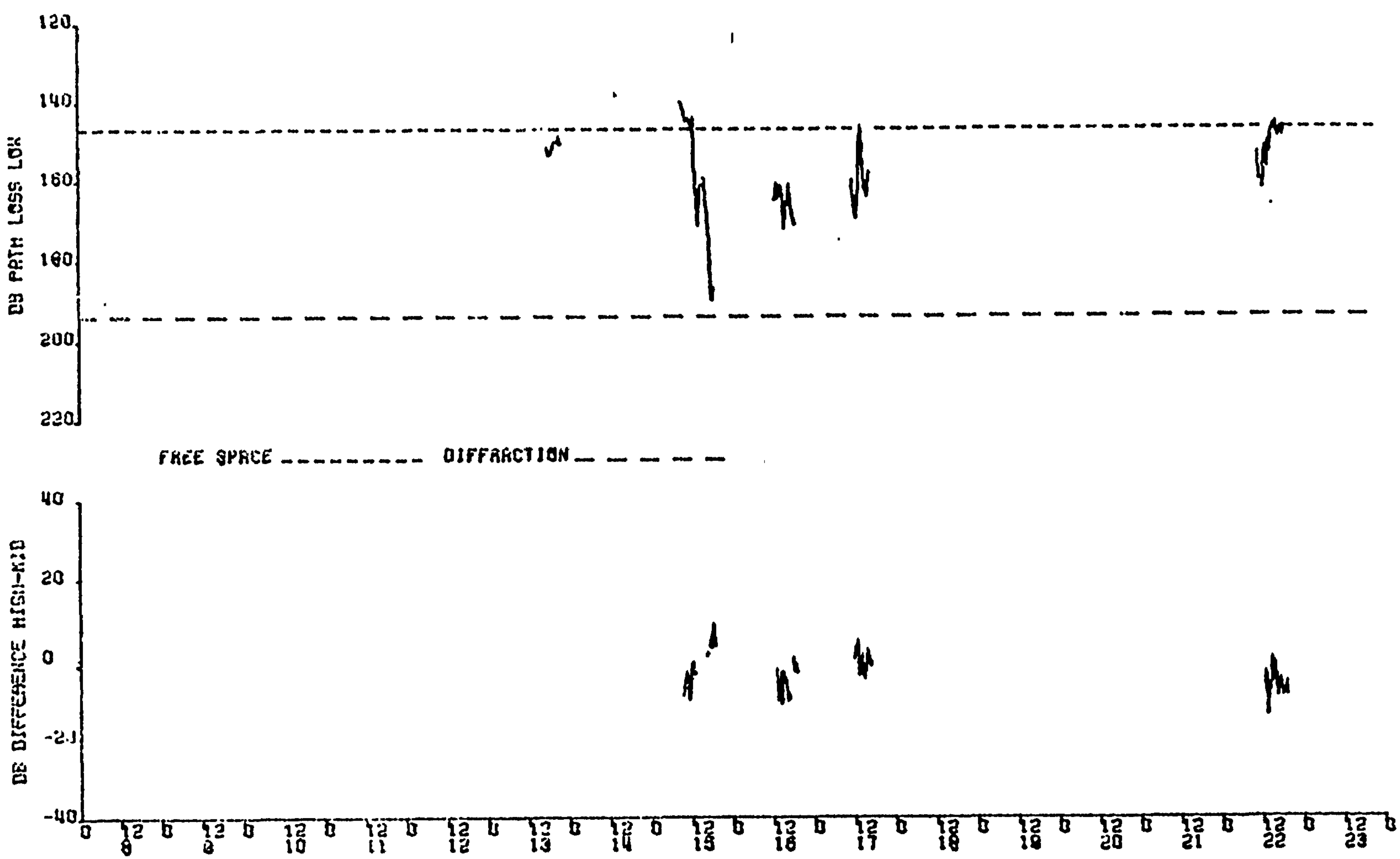
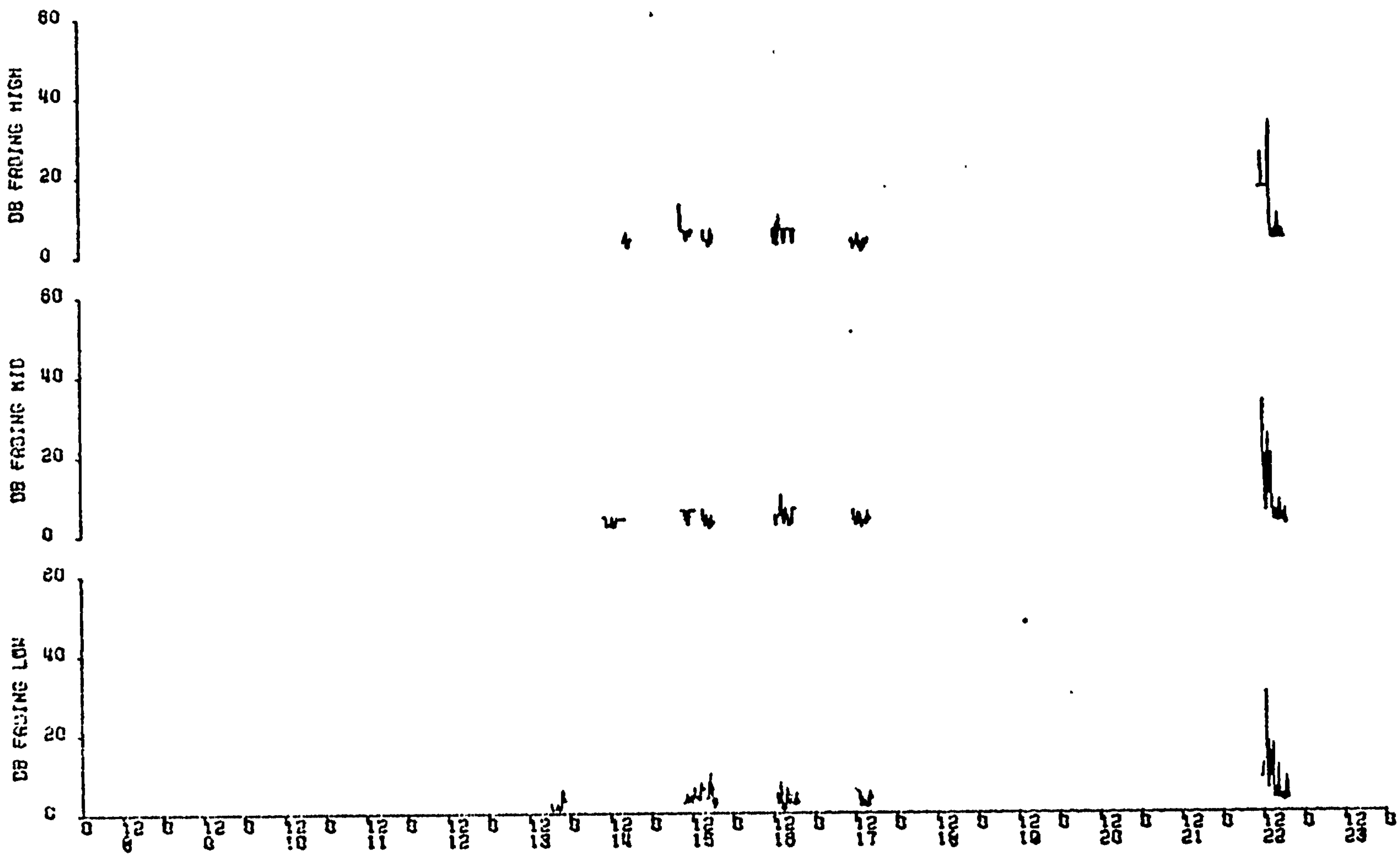


Figure 31. Path loss for middle Ku-band antenna and path loss difference mid-low antenna.



KU BAND MARQUESAS TO KEY WEST, FLORIDA MAY, 1972

Figure 32. Path loss for low Ku-band antenna and path loss difference high-mid antenna.



KU BAND MARQUESAS TO KEY WEST, FLORIDA MAY,1972

Figure 33. Fading Ku-band.

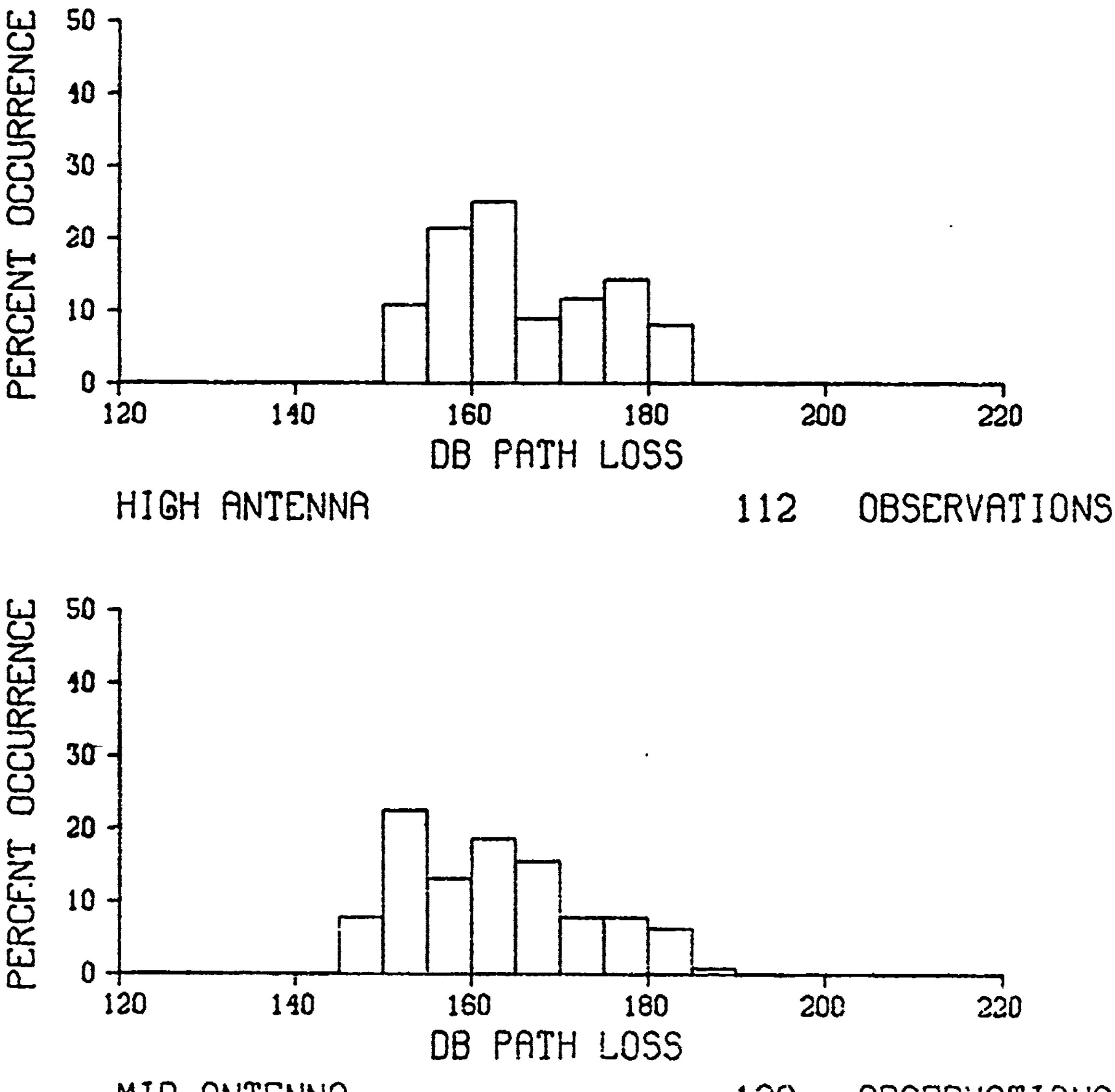


Figure 34. Frequency distributions of path loss for Ku-band.

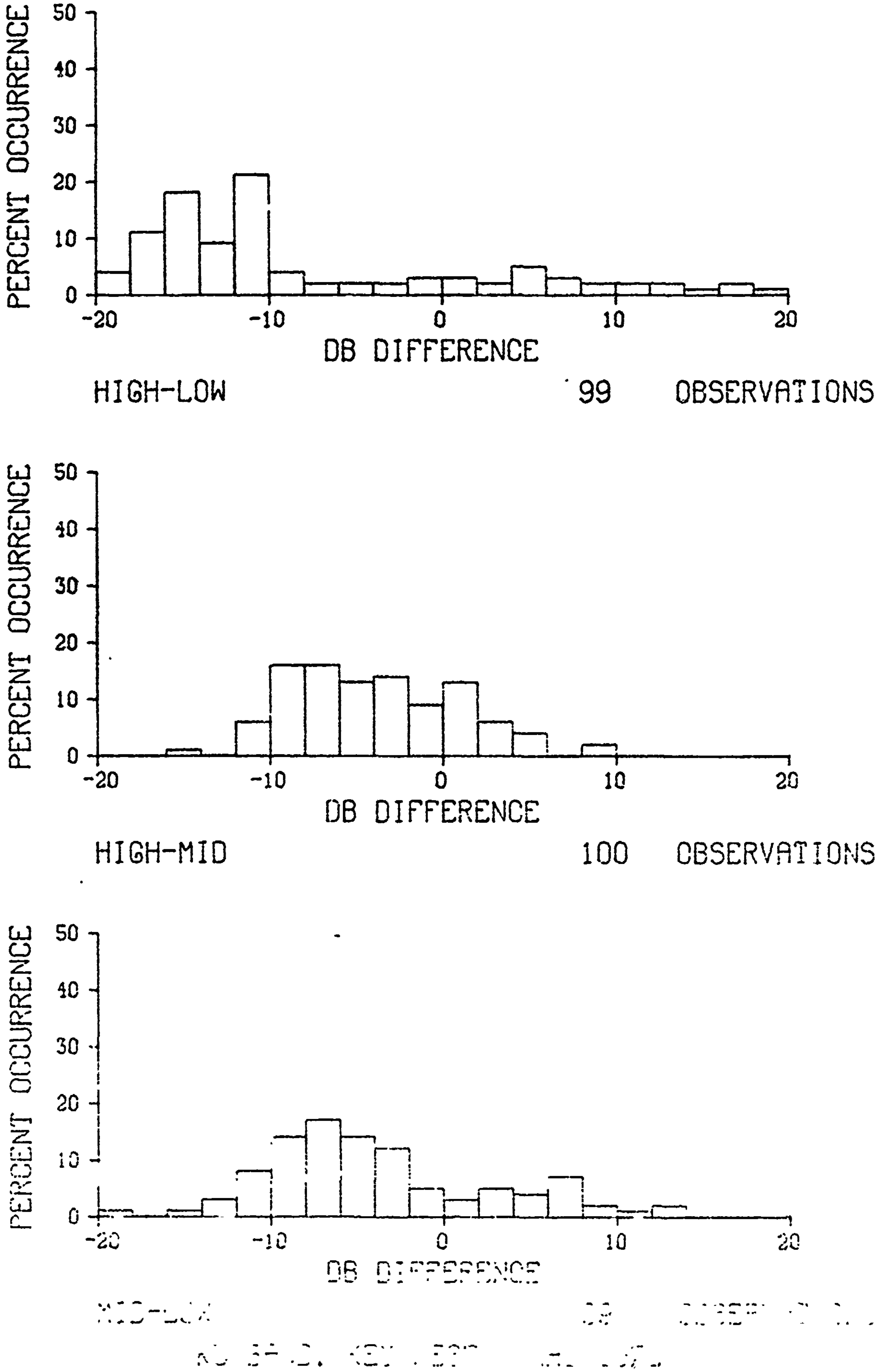


Figure 35. Frequency distributions of path loss differences for Ku-band.

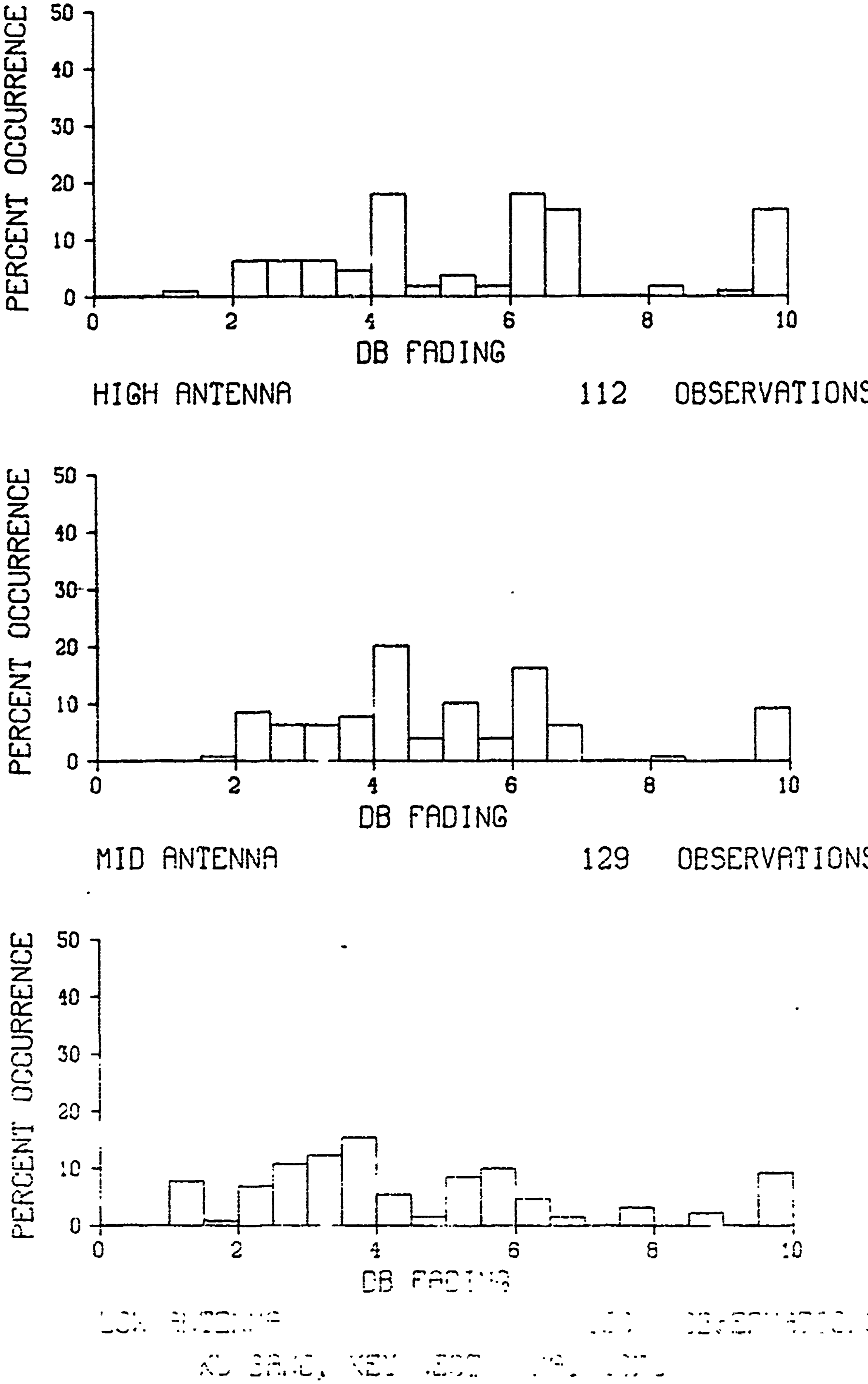


Figure 36. Frequency distributions of fading for Ku-band.

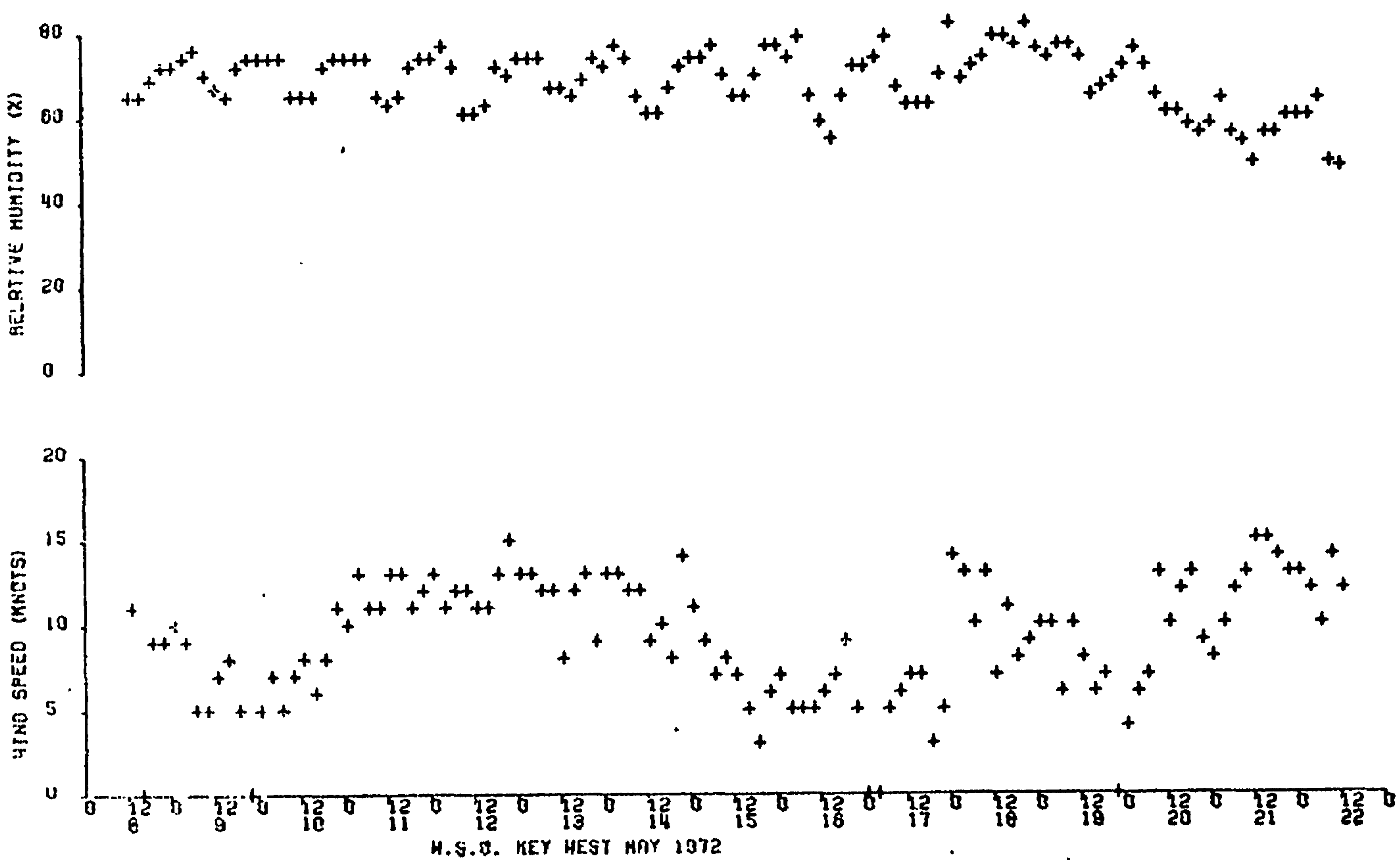


Figure 37. Relative humidity and wind speed for 8-22 May 1972 at Key West.

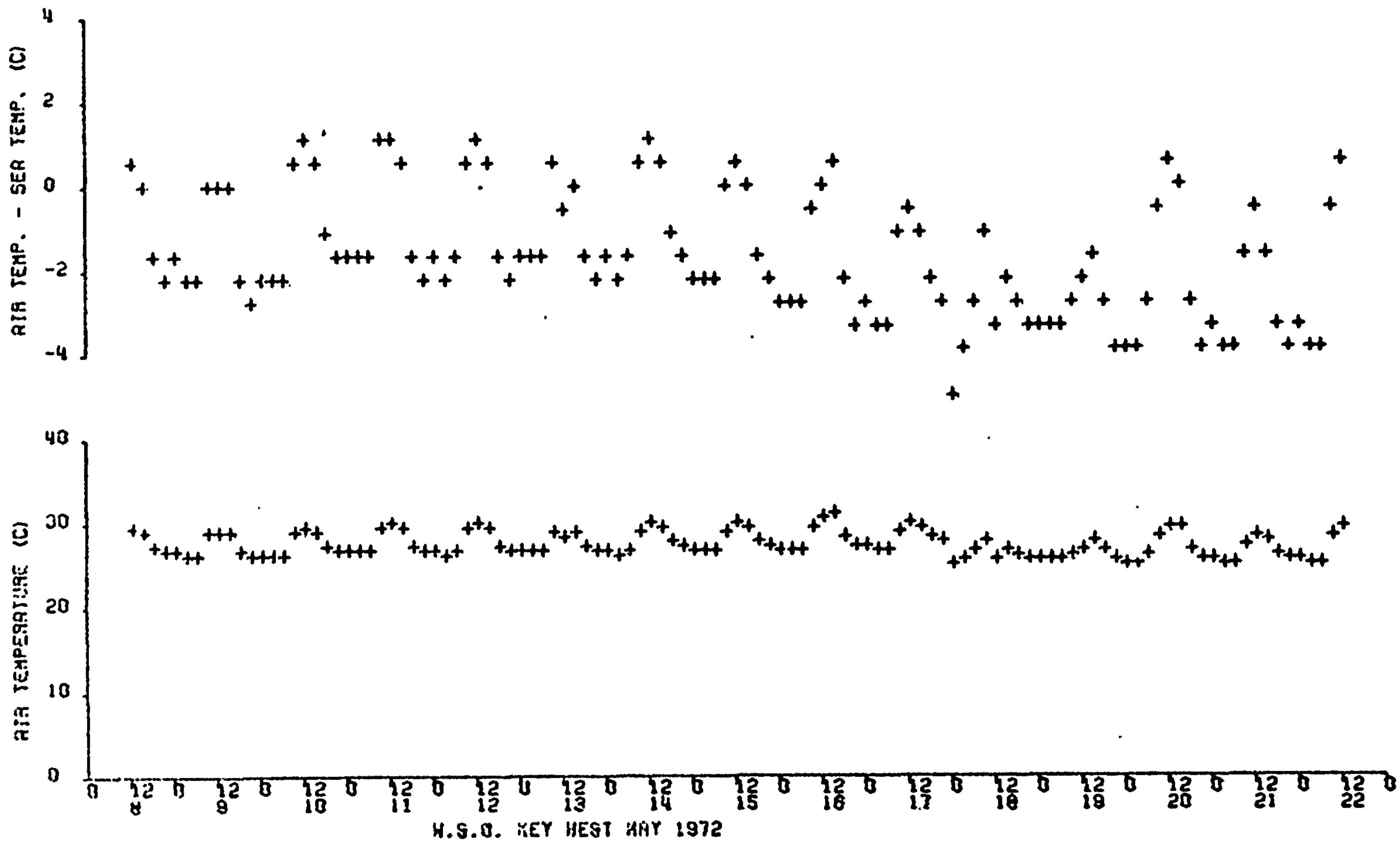


Figure 38. Air temperature - sea temperature difference and air temperature for 8-22 May 1972 at Key West

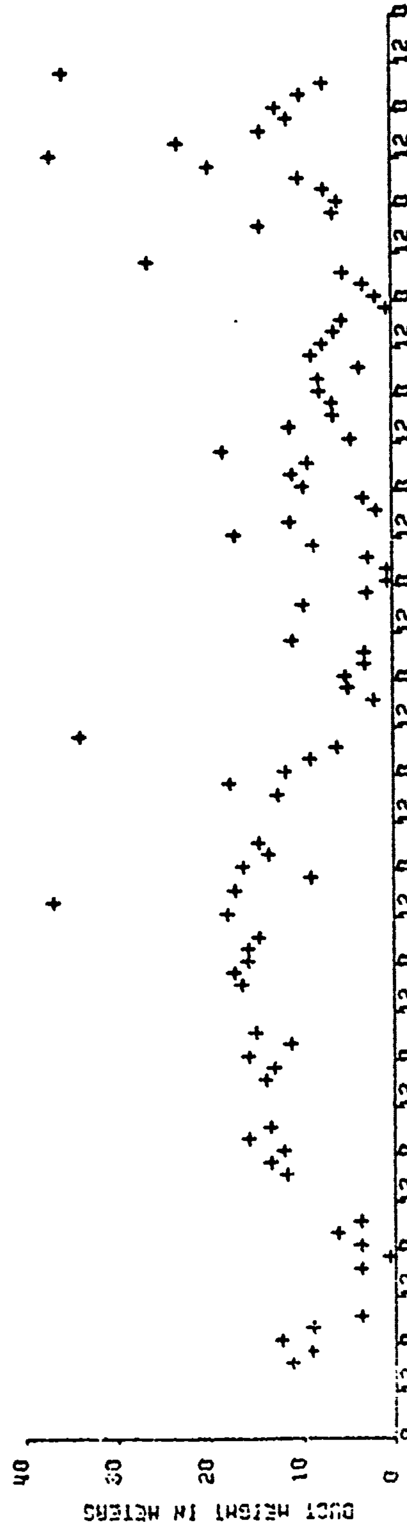


Figure 39. Duct height for 8-22 May 1972 at Key West.

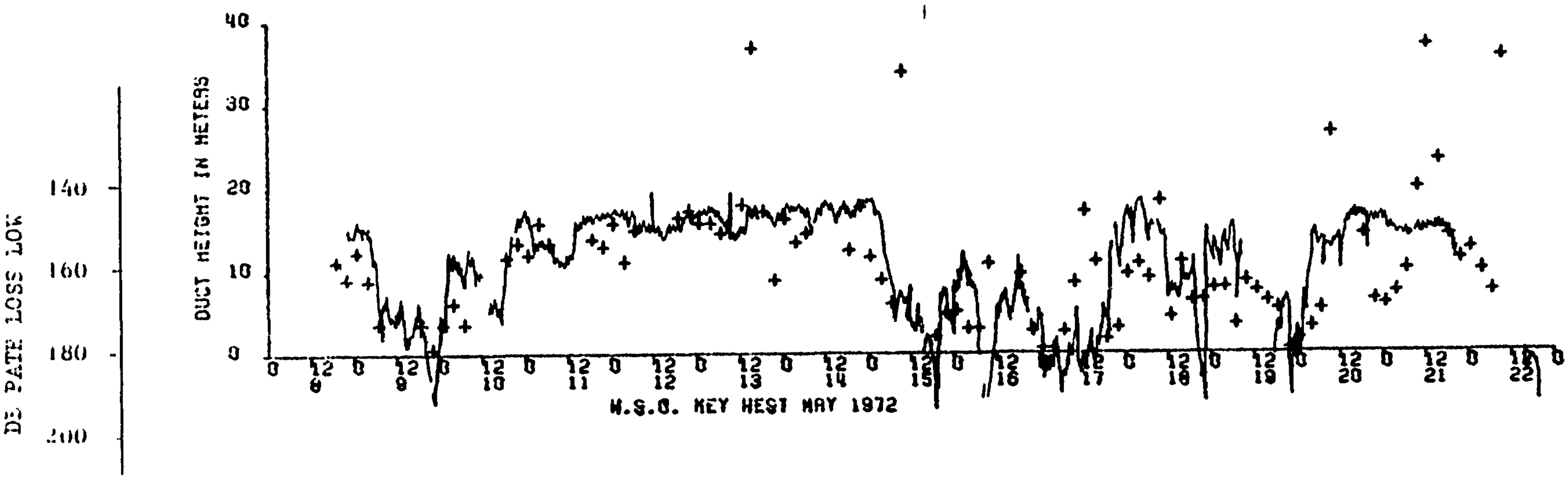


Figure 40. Path loss for low X-band antenna (solid curve) and duct height (asterisks).

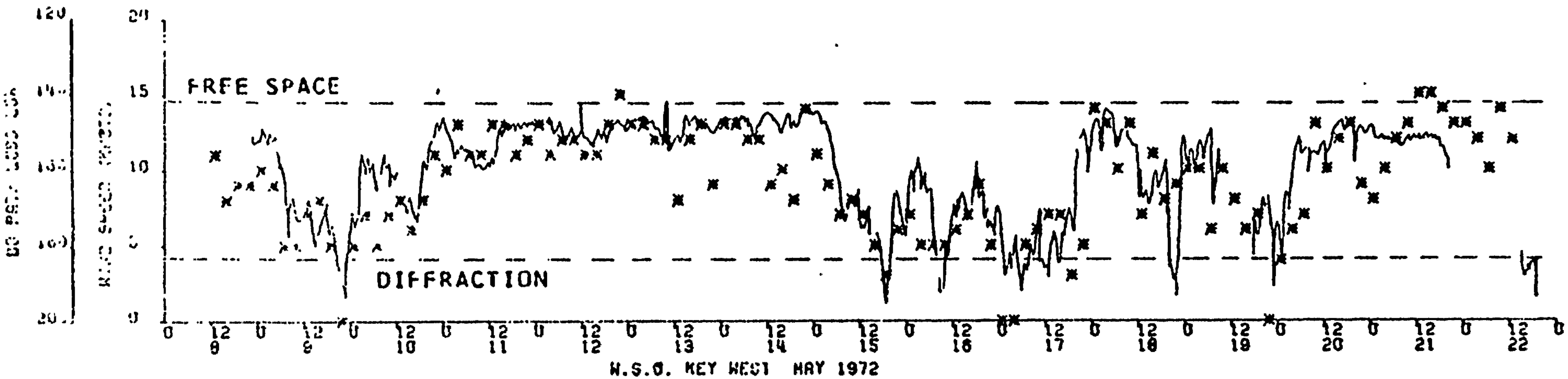


Figure 41. Path loss for low X-band antenna (solid curve) and wind speed (asterisks).

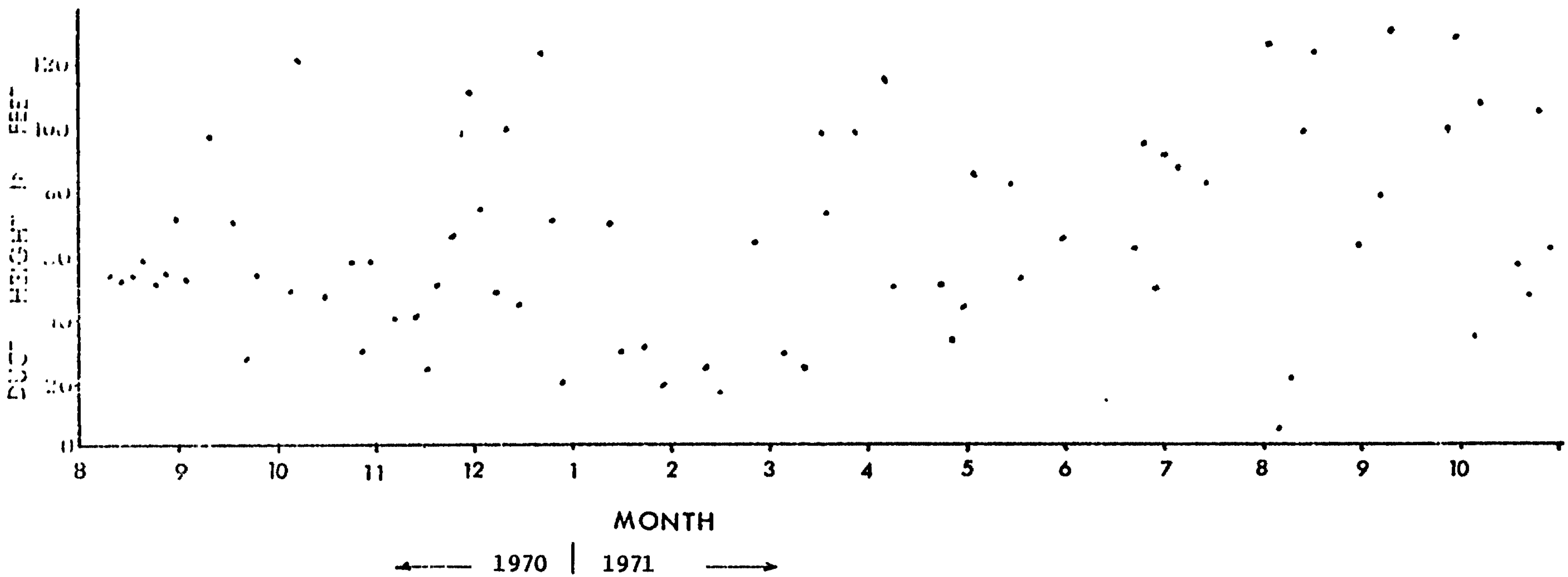
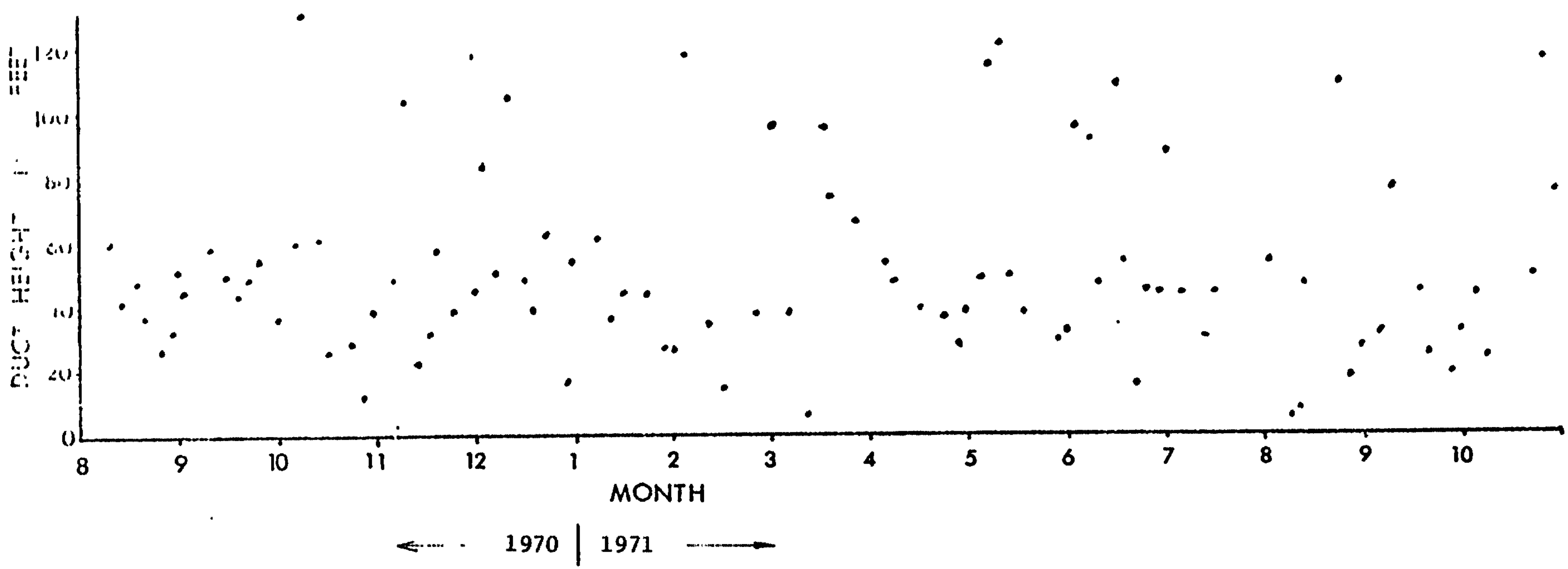


Figure 42. Duct height for August 1970-October 1971 using 1000 hours observations.



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L BAND MARQUESAS TO KEY WEST, FLORDIA MAY,1972

HIGH-LOW	MID-LOW	HIGH-MID
1.0 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
98.8 % > 15.0 DB	0.3 % > 15.0 DB	0.3 % > 15.0 DB
99.4 % > 10.0 DB	0.8 % > 10.0 DB	54.3 % > 10.0 DB
99.6 % > 6.0 DB	61.0 % > 6.0 DB	99.7 % > 6.0 DB
100.0 % > 3.0 DB	98.6 % > 3.0 DB	99.9 % > 3.0 DB
100.0 % > 0.0 DB	99.6 % > 0.0 DB	100.0 % > 0.0 DB
100.0 % > -3.0 DB	99.7 % > -3.0 DB	100.0 % > -3.0 DB
100.0 % > -6.0 DB	99.9 % > -6.0 DB	100.0 % > -6.0 DB
100.0 % > -10.0 DB	100.0 % > -10.0 DB	100.0 % > -10.0 DB
100.0 % > -15.0 DB	100.0 % > -15.0 DB	100.0 % > -15.0 DB
100.0 % > -20.0 DB	100.0 % > -20.0 DB	100.0 % > -20.0 DB
TOTAL ENTRIES = 780	TOTAL ENTRIES = 787	TOTAL ENTRIES = 785

FADING HIGH	FADING MIDDLE	FADING LOW
0.0 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
0.0 % > 15.0 DB	0.0 % > 15.0 DB	0.0 % > 15.0 DB
0.0 % > 10.0 DB	0.0 % > 10.0 DB	0.4 % > 10.0 DB
0.0 % > 8.0 DB	0.3 % > 8.0 DB	1.8 % > 8.0 DB
0.0 % > 6.0 DB	1.3 % > 6.0 DB	2.6 % > 6.0 DB
0.3 % > 5.0 DB	3.8 % > 5.0 DB	7.0 % > 5.0 DB
1.6 % > 4.0 DB	5.4 % > 4.0 DB	11.9 % > 4.0 DB
12.6 % > 3.0 DB	30.1 % > 3.0 DB	39.8 % > 3.0 DB
18.1 % > 2.0 DB	41.0 % > 2.0 DB	43.5 % > 2.0 DB
98.0 % > 1.0 DB	99.6 % > 1.0 DB	97.7 % > 1.0 DB
TOTAL ENTRIES = 793	TOTAL ENTRIES = 797	TOTAL ENTRIES = 798

TABLE I. Statistical presentation for L-band.

L BAND, KEY WEST MAY 1972

PATH LOSS	% HIGH	% MID	% LOW
120.0 TO 125.0	0.0	0.0	0.0
125.0 TO 130.0	0.0	0.0	0.0
130.0 TO 135.0	0.0	0.0	0.0
135.0 TO 140.0	7.6	0.0	0.0
140.0 TO 145.0	17.3	0.0	0.0
145.0 TO 150.0	43.5	7.3	0.0
150.0 TO 155.0	27.0	20.5	0.5
155.0 TO 160.0	4.7	36.0	17.4
160.0 TO 165.0	0.0	30.9	35.8
165.0 TO 170.0	0.0	5.4	39.8
170.0 TO 175.0	0.0	0.0	4.0
175.0 TO 180.0	0.0	0.0	2.1
180.0 TO 185.0	0.0	0.0	0.3
185.0 TO 190.0	0.0	0.0	0.0
190.0 TO 195.0	0.0	0.0	0.0
195.0 TO 200.0	0.0	0.0	0.0
200.0 TO 205.0	0.0	0.0	0.0
205.0 TO 210.0	0.0	0.0	0.0
210.0 TO 215.0	0.0	0.0	0.0
215.0 TO 220.0	0.0	0.0	0.0
ENTRIES	793	797	798

TABLE 2. Frequency distributions of path loss for L-band.

L BAND, KEY WEST MAY 1972

DIFFERENCE	% HIGH-LOW	% HIGH-MID	% MID-LOW
-20.0 TO -18.0	0.0	0.0	0.0
-18.0 TO -16.0	0.0	0.0	0.0
-16.0 TO -14.0	0.0	0.0	0.0
-14.0 TO -12.0	0.0	0.0	0.0
-12.0 TO -10.0	0.0	0.0	0.0
-10.0 TO -8.0	0.0	0.0	0.0
-8.0 TO -6.0	0.0	0.0	0.1
-6.0 TO -4.0	0.0	0.0	0.0
-4.0 TO -2.0	0.0	0.0	0.3
-2.0 TO 0.0	0.0	0.0	0.0
0.0 TO 2.0	0.0	0.1	0.5
2.0 TO 4.0	0.3	0.0	1.1
4.0 TO 6.0	0.1	0.1	20.5
6.0 TO 8.0	0.1	2.4	68.6
8.0 TO 10.0	0.1	30.6	8.0
10.0 TO 12.0	0.4	65.2	0.4
12.0 TO 14.0	2.2	1.3	0.1
14.0 TO 16.0	15.5	0.0	0.3
16.0 TO 18.0	64.4	0.1	0.1
18.0 TO 20.0	16.9	0.1	0.0
ENTRIES	780	785	787

TABLE 3. Frequency distributions of path loss differences between antennas for L-band.

L BAND, KEY WEST MAY 1972

FADING	% HIGH	% MID	% LOW
0.0 TO 0.5	0.3	0.0	0.1
0.5 TO 1.0	3.8	0.4	2.1
1.0 TO 1.5	0.0	0.0	0.0
1.5 TO 2.0	79.8	58.6	54.3
2.0 TO 2.5	0.0	0.0	0.0
2.5 TO 3.0	3.5	4.9	3.6
3.0 TO 3.5	8.6	5.0	0.0
3.5 TO 4.0	2.4	25.7	27.9
4.0 TO 4.5	0.4	0.0	0.0
4.5 TO 5.0	0.6	1.3	2.0
5.0 TO 5.5	0.4	0.4	2.9
5.5 TO 6.0	0.3	2.5	4.4
6.0 TO 6.5	0.0	0.4	0.1
6.5 TO 7.0	0.0	0.1	0.0
7.0 TO 7.5	0.0	0.1	0.4
7.5 TO 8.0	0.0	0.0	0.4
8.0 TO 8.5	0.0	0.4	0.0
8.5 TO 9.0	0.0	0.0	0.0
9.0 TO 9.5	0.0	0.3	0.4
9.5 TO 10.0	0.0	0.0	1.4
ENTRIES	793	797	796

TABLE 4. Frequency distributions of fading L-band.

S BAND MARQUESAS TO KEY WEST, FLORDIA MAY,1972

HIGH-LOW

1.1	%	>	20.0 DB
2.9	%	>	15.0 DB
64.5	%	>	10.0 DB
96.7	%	>	6.0 DB
99.5	%	>	3.0 DB
99.9	%	>	0.0 DB
99.9	%	>	-3.0 DB
100.0	%	>	-6.0 DB
100.0	%	>	-10.0 DB
100.0	%	>	-15.0 DB
100.0	%	>	-20.0 DB

TOTAL ENTRIES = 1018

MID-LOW

0.4	%	>	20.0 DB
0.8	%	>	15.0 DB
1.7	%	>	10.0 DB
34.6	%	>	6.0 DB
96.2	%	>	3.0 DB
98.9	%	>	0.0 DB
99.7	%	>	-3.0 DB
100.0	%	>	-6.0 DB
100.0	%	>	-10.0 DB
100.0	%	>	-15.0 DB
100.0	%	>	-20.0 DB

TOTAL ENTRIES = 998

HIGH-MID

0.1	%	>	20.0 DB
0.2	%	>	15.0 DB
0.9	%	>	10.0 DB
27.3	%	>	6.0 DB
91.0	%	>	3.0 DB
99.6	%	>	0.0 DB
99.8	%	>	-3.0 DB
99.8	%	>	-6.0 DB
100.0	%	>	-10.0 DB
100.0	%	>	-15.0 DB
100.0	%	>	-20.0 DB

TOTAL ENTRIES = 1010

FADING HIGH

0.0	%	>	20.0 DB
0.0	%	>	15.0 DB
0.0	%	>	10.0 DB
0.0	%	>	8.0 DB
0.0	%	>	6.0 DB
0.0	%	>	5.0 DB
0.3	%	>	4.0 DB
2.9	%	>	3.0 DB
20.3	%	>	2.0 DB
72.9	%	>	1.0 DB

TOTAL ENTRIES = 1116

FADING MIDDLE

0.0	%	>	20.0 DB
0.0	%	>	15.0 DB
0.0	%	>	10.0 DB
0.0	%	>	8.0 DB
0.0	%	>	6.0 DB
0.1	%	>	5.0 DB
1.0	%	>	4.0 DB
7.2	%	>	3.0 DB
27.8	%	>	2.0 DB
82.0	%	>	1.0 DB

TOTAL ENTRIES = 1080

FADING LOW

0.0	%	>	20.0 DB
0.0	%	>	15.0 DB
0.0	%	>	10.0 DB
0.7	%	>	8.0 DB
0.9	%	>	6.0 DB
1.9	%	>	5.0 DB
5.1	%	>	4.0 DB
21.4	%	>	3.0 DB
37.4	%	>	2.0 DB
88.4	%	>	1.0 DB

TOTAL ENTRIES = 1109

TABLE 5. Statistical presentation for S-band.

S BAND, KEY WEST MAY 1972

PATH LOSS	% HIGH	% MID	% LOW
120.0 TO 125.0	0.0	0.0	0.0
125.0 TO 130.0	0.0	0.0	0.0
130.0 TO 135.0	0.0	0.0	0.0
135.0 TO 140.0	0.0	0.0	0.0
140.0 TO 145.0	2.0	0.0	0.0
145.0 TO 150.0	14.8	3.3	0.0
150.0 TO 155.0	25.0	15.4	3.9
155.0 TO 160.0	24.4	21.1	13.6
160.0 TO 165.0	21.1	21.0	19.1
165.0 TO 170.0	11.0	24.9	25.9
170.0 TO 175.0	1.1	9.5	20.2
175.0 TO 180.0	0.0	4.0	11.0
180.0 TO 185.0	0.3	0.0	4.1
185.0 TO 190.0	0.4	0.6	1.0
190.0 TO 195.0	0.0	0.2	0.8
195.0 TO 200.0	0.0	0.0	0.4
200.0 TO 205.0	0.0	0.0	0.0
205.0 TO 210.0	0.0	0.0	0.0
210.0 TO 215.0	0.0	0.0	0.0
215.0 TO 220.0	0.0	0.0	0.0
ENTRIES	1116	1080	1109

TABLE 6. Frequency distributions of path loss for S-band.

DIFFERENCE	% HIGH-LOW	% HIGH-MID	% MID-LOW
-20.0 TO -18.0	0.0	0.0	0.0
-18.0 TO -16.0	0.0	0.0	0.0
-16.0 TO -14.0	0.0	0.0	0.0
-14.0 TO -12.0	0.0	0.0	0.0
-12.0 TO -10.0	0.0	0.0	0.0
-10.0 TO -8.0	0.0	0.0	0.0
-8.0 TO -6.0	0.0	0.2	0.0
-6.0 TO -4.0	0.1	0.0	0.1
-4.0 TO -2.0	0.0	0.1	0.2
-2.0 TO 0.0	0.0	0.1	0.8
0.0 TO 2.0	0.1	1.4	0.2
2.0 TO 4.0	0.5	20.3	9.0
4.0 TO 6.0	2.7	46.7	52.9
6.0 TO 8.0	11.0	28.2	32.5
8.0 TO 10.0	19.1	2.0	2.6
10.0 TO 12.0	38.9	0.8	0.3
12.0 TO 14.0	21.2	0.0	0.4
14.0 TO 16.0	4.3	0.0	0.3
16.0 TO 18.0	0.9	0.1	0.2
18.0 TO 20.0	1.3	0.1	0.5
ENTRIES	1018	1010	998

TABLE 7. Frequency distributions of path loss differences between antennas for S-band.

S BAND, KEY WEST   MAY 1972

FADING	% HIGH	% MID	% LOW
0.0 TO 0.5	1.8	1.1	0.5
0.5 TO 1.0	14.8	8.2	6.9
1.0 TO 1.5	33.1	26.4	14.6
1.5 TO 2.0	27.9	33.0	31.7
2.0 TO 2.5	8.8	12.4	13.5
2.5 TO 3.0	10.8	11.5	10.6
3.0 TO 3.5	2.2	5.0	9.5
3.5 TO 4.0	0.4	1.4	5.7
4.0 TO 4.5	0.2	0.4	2.3
4.5 TO 5.0	0.0	0.1	0.8
5.0 TO 5.5	0.1	0.6	2.0
5.5 TO 6.0	0.0	0.0	0.8
6.0 TO 6.5	0.0	0.0	0.2
6.5 TO 7.0	0.0	0.0	0.0
7.0 TO 7.5	0.0	0.0	0.1
7.5 TO 8.0	0.0	0.0	0.1
8.0 TO 8.5	0.0	0.0	0.0
8.5 TO 9.0	0.0	0.0	0.0
9.0 TO 9.5	0.0	0.0	0.0
9.5 TO 10.0	0.0	0.0	0.7
ENTRIES	1116	1080	1109

TABLE 8. Frequency distributions of fading S-band.

X BAND MARQUESAS TO KEY WEST, FLORDIA MAY,1972

HIGH-LOW	MID-LOW	HIGH-MID
0.2 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
1.5 % > 15.0 DB	0.1 % > 15.0 DB	0.0 % > 15.0 DB
9.4 % > 10.0 DB	0.1 % > 10.0 DB	0.6 % > 10.0 DB
22.6 % > 6.0 DB	3.2 % > 6.0 DB	9.9 % > 6.0 DB
30.8 % > 3.0 DB	17.4 % > 3.0 DB	26.7 % > 3.0 DB
38.6 % > 0.0 DB	37.6 % > 0.0 DB	39.3 % > 0.0 DB
43.6 % > -3.0 DB	56.6 % > -3.0 DB	57.8 % > -3.0 DB
49.7 % > -6.0 DB	75.2 % > -6.0 DB	74.7 % > -6.0 DB
62.9 % > -10.0 DB	92.8 % > -10.0 DB	91.3 % > -10.0 DB
84.5 % > -15.0 DB	99.2 % > -15.0 DB	98.4 % > -15.0 DB
96.1 % > -20.0 DB	99.9 % > -20.0 DB	100.0 % > -20.0 DB
TOTAL ENTRIES = 1160	TOTAL ENTRIES = 1185	TOTAL ENTRIES = 1183

FADING HIGH	FADING MIDDLE	FADING LOW
0.0 % > 20.0 DB	0.0 % > 20.0 DB	0.0 % > 20.0 DB
0.3 % > 15.0 DB	0.0 % > 15.0 DB	0.2 % > 15.0 DB
2.7 % > 10.0 DB	0.2 % > 10.0 DB	0.3 % > 10.0 DB
3.5 % > 8.0 DB	0.5 % > 8.0 DB	0.7 % > 8.0 DB
19.4 % > 6.0 DB	2.3 % > 6.0 DB	1.5 % > 6.0 DB
23.5 % > 5.0 DB	4.6 % > 5.0 DB	2.9 % > 5.0 DB
33.3 % > 4.0 DB	13.8 % > 4.0 DB	9.9 % > 4.0 DB
49.8 % > 3.0 DB	36.8 % > 3.0 DB	33.5 % > 3.0 DB
63.5 % > 2.0 DB	60.4 % > 2.0 DB	51.3 % > 2.0 DB
92.5 % > 1.0 DB	95.6 % > 1.0 DB	90.8 % > 1.0 DB
TOTAL ENTRIES = 1174	TOTAL ENTRIES = 1189	TOTAL ENTRIES = 1189

TABLE 9. Statistical presentation for X-band.

X BAND, KEY WEST MAY 1972

PATH LOSS	% HIGH	% MID	% LOW
120.0 TO 125.0	0.0	0.0	0.0
125.0 TO 130.0	0.0	0.0	0.0
130.0 TO 135.0	0.0	0.0	0.0
135.0 TO 140.0	0.0	0.0	0.0
140.0 TO 145.0	0.0	0.0	2.3
145.0 TO 150.0	0.0	1.1	27.1
150.0 TO 155.0	4.7	26.3	23.2
155.0 TO 160.0	27.2	25.4	9.9
160.0 TO 165.0	29.1	16.0	5.3
165.0 TO 170.0	26.5	12.6	8.4
170.0 TO 175.0	10.6	8.8	9.2
175.0 TO 180.0	2.0	4.9	5.5
180.0 TO 185.0	0.0	4.0	5.1
185.0 TO 190.0	0.0	0.9	2.6
190.0 TO 195.0	0.0	0.0	1.3
195.0 TO 200.0	0.0	0.0	0.1
200.0 TO 205.0	0.0	0.0	0.0
205.0 TO 210.0	0.0	0.0	0.0
210.0 TO 215.0	0.0	0.0	0.0
215.0 TO 220.0	0.0	0.0	0.0
ENTRIES	1177	1172	1172

TABLE 10. Frequency distributions of path loss for X-band.

X BAND, KEY WEST MAY 1972

DIFFERENCE	% HIGH-LOW	% HIGH-MID	% MID-LOW
-20.0 TO -18.0	7.1	0.3	0.4
-18.0 TO -16.0	5.2	0.9	0.3
-16.0 TO -14.0	6.6	1.5	0.4
-14.0 TO -12.0	7.1	2.5	1.2
-12.0 TO -10.0	11.0	3.8	4.5
-10.0 TO -8.0	7.1	5.3	6.0
-8.0 TO -6.0	5.3	10.1	10.9
-6.0 TO -4.0	4.8	13.4	18.4
-4.0 TO -2.0	2.8	9.8	11.2
-2.0 TO 0.0	3.8	12.8	7.6
0.0 TO 2.0	3.7	8.1	12.7
2.0 TO 4.0	6.4	9.4	15.1
4.0 TO 6.0	5.8	12.1	8.0
6.0 TO 8.0	6.7	6.1	2.6
8.0 TO 10.0	6.9	3.4	0.6
10.0 TO 12.0	4.0	0.6	0.0
12.0 TO 14.0	3.0	0.1	0.0
14.0 TO 16.0	1.5	0.0	0.1
16.0 TO 18.0	0.6	0.0	0.0
18.0 TO 20.0	0.6	0.0	0.0
ENTRIES	1163	1166	1166

TABLE 11. Frequency distributions of path loss differences between antennas for X-band.

X BAND, KEY WEST   MAY 1972

FADING	% HIGH	% MID	% LOW
0.0 TO 0.5	0.1	0.0	1.0
0.5 TO 1.0	4.3	3.5	7.8
1.0 TO 1.5	7.4	6.2	7.3
1.5 TO 2.0	23.3	27.6	32.1
2.0 TO 2.5	7.6	7.1	2.9
2.5 TO 3.0	7.3	16.5	12.5
3.0 TO 3.5	11.9	20.6	22.2
3.5 TO 4.0	2.8	3.3	2.6
4.0 TO 4.5	4.2	5.9	5.8
4.5 TO 5.0	6.3	2.9	0.9
5.0 TO 5.5	2.3	3.1	2.6
5.5 TO 6.0	2.0	0.7	0.5
6.0 TO 6.5	4.7	1.4	0.2
6.5 TO 7.0	3.4	0.2	0.8
7.0 TO 7.5	0.4	0.0	0.1
7.5 TO 8.0	2.0	0.3	0.0
8.0 TO 8.5	3.5	0.4	0.0
8.5 TO 9.0	0.8	0.0	0.1
9.0 TO 9.5	[illegible]	0.0	0.0
9.5 TO 10.0	[illegible]	0.3	0.5
ENTRIES	1177	1172	1172

TABLE 12. Frequency distributions of fading X-band.

KU BAND MARQUESAS TO KEY WEST, FLORDIA MAY,1972

HIGH-LOW		MID-LOW		HIGH-MID	
1.0 % >	20.0 DB	0.0 % >	20.0 DB	0.0 % >	20.0 DB
3.0 % >	15.0 DB	0.0 % >	15.0 DB	0.0 % >	15.0 DB
8.1 % >	10.0 DB	3.0 % >	10.0 DB	0.0 % >	10.0 DB
13.1 % >	6.0 DB	12.1 % >	6.0 DB	2.0 % >	6.0 DB
17.2 % >	3.0 DB	19.2 % >	3.0 DB	8.0 % >	3.0 DB
23.2 % >	0.0 DB	24.2 % >	0.0 DB	19.0 % >	0.0 DB
28.3 % >	-3.0 DB	35.4 % >	-3.0 DB	35.0 % >	-3.0 DB
30.3 % >	-6.0 DB	53.5 % >	-6.0 DB	60.0 % >	-6.0 DB
55.4 % >	-10.0 DB	86.9 % >	-10.0 DB	91.0 % >	-10.0 DB
73.8 % >	-15.0 DB	99.0 % >	-15.0 DB	100.0 % >	-15.0 DB
100.0 % >	-20.0 DB	100.0 % >	-20.0 DB	100.0 % >	-20.0 DB
TOTAL ENTRIES =	99	TOTAL ENTRIES =	99	TOTAL ENTRIES =	100

FADING HIGH		FADING MIDDLE		FADING LOW	
1.8 % >	20.0 DB	1.6 % >	20.0 DB	1.5 % >	20.0 DB
11.6 % >	15.0 DB	4.7 % >	15.0 DB	3.1 % >	15.0 DB
13.4 % >	10.0 DB	7.0 % >	10.0 DB	7.7 % >	10.0 DB
17.0 % >	8.0 DB	9.3 % >	8.0 DB	11.5 % >	8.0 DB
45.5 % >	6.0 DB	27.9 % >	6.0 DB	20.0 % >	6.0 DB
52.7 % >	5.0 DB	36.4 % >	5.0 DB	30.8 % >	5.0 DB
58.0 % >	4.0 DB	54.3 % >	4.0 DB	41.5 % >	4.0 DB
85.7 % >	3.0 DB	83.7 % >	3.0 DB	69.2 % >	3.0 DB
97.3 % >	2.0 DB	99.2 % >	2.0 DB	89.2 % >	2.0 DB
100.0 % >	1.0 DB	100.0 % >	1.0 DB	100.0 % >	1.0 DB
TOTAL ENTRIES =	112	TOTAL ENTRIES =	129	TOTAL ENTRIES =	130

TABLE 13. Statistical presentation for Ku-band.

KU BAND, KEY WEST MAY 1972

PATH LOSS	% HIGH	% MID	% LOW
120.0 TO 125.0	0.0	0.0	0.0
125.0 TO 130.0	0.0	0.0	0.0
130.0 TO 135.0	0.0	0.0	0.0
135.0 TO 140.0	0.0	0.0	0.0
140.0 TO 145.0	0.0	0.0	8.5
145.0 TO 150.0	0.0	7.8	20.0
150.0 TO 155.0	10.7	22.5	20.8
155.0 TO 160.0	21.4	13.2	3.8
160.0 TO 165.0	25.0	18.6	26.9
165.0 TO 170.0	8.9	15.5	11.5
170.0 TO 175.0	11.6	7.8	3.8
175.0 TO 180.0	14.3	7.8	0.8
180.0 TO 185.0	8.0	6.2	0.8
185.0 TO 190.0	0.0	0.8	1.5
190.0 TO 195.0	0.0	0.0	1.5
195.0 TO 200.0	0.0	0.0	0.0
200.0 TO 205.0	0.0	0.0	0.0
205.0 TO 210.0	0.0	0.0	0.0
210.0 TO 215.0	0.0	0.0	0.0
215.0 TO 220.0	0.0	0.0	0.0
ENTRIES	112	129	130

TABLE 14. Frequency distributions of path loss for Ku-band.

KU BAND, KEY WEST MAY 1972

DIFFERENCE	% HIGH-LOW	% HIGH-MID	% MID-LOW
-20.0 TO -18.0	4.0	0.0	1.0
-18.0 TO -16.0	11.1	0.0	0.0
-16.0 TO -14.0	18.2	1.0	1.0
-14.0 TO -12.0	9.1	0.0	3.0
-12.0 TO -10.0	21.2	6.0	8.1
-10.0 TO -8.0	4.0	16.0	14.1
-8.0 TO -6.0	2.0	16.0	17.2
-6.0 TO -4.0	2.0	13.0	14.1
-4.0 TO -2.0	2.0	14.0	12.1
-2.0 TO 0.0	3.0	9.0	5.1
0.0 TO 2.0	3.0	13.0	3.0
2.0 TO 4.0	2.0	6.0	5.1
4.0 TO 6.0	5.1	4.0	4.0
6.0 TO 8.0	3.0	0.0	7.1
8.0 TO 10.0	2.0	2.0	2.0
10.0 TO 12.0	2.0	0.0	1.0
12.0 TO 14.0	2.0	0.0	2.0
14.0 TO 16.0	1.0	0.0	0.0
16.0 TO 18.0	2.0	0.0	0.0
18.0 TO 20.0	1.0	0.0	0.0
ENTRIES	99	100	99

TABLE 15. Frequency distributions of path loss differences between antennas for Ku-band.

KU BAND, KEY WEST MAY 1972

FADING	% HIGH	% MID	% LOW
0.0 TO 0.5	0.0	0.0	0.0
0.5 TO 1.0	0.0	0.0	0.0
1.0 TO 1.5	0.9	0.0	7.7
1.5 TO 2.0	0.0	0.8	0.8
2.0 TO 2.5	6.3	8.5	6.9
2.5 TO 3.0	6.3	6.2	10.8
3.0 TO 3.5	6.3	6.2	12.3
3.5 TO 4.0	4.5	7.8	15.4
4.0 TO 4.5	17.9	20.2	5.4
4.5 TO 5.0	1.8	3.9	1.5
5.0 TO 5.5	3.6	10.1	8.5
5.5 TO 6.0	1.8	3.9	10.0
6.0 TO 6.5	17.9	16.3	4.6
6.5 TO 7.0	15.2	6.2	1.5
7.0 TO 7.5	0.0	0.0	0.0
7.5 TO 8.0	0.0	0.0	3.1
8.0 TO 8.5	1.8	0.3	0.0
8.5 TO 9.0	0.0	0.0	2.3
9.0 TO 9.5	0.9	0.0	0.0
9.5 TO 10.0	15.2	9.3	9.2
ENTRIES	112	129	130

TABLE 16. Frequency distributions of fading Ku-band.

X. APPENDIX

Climatological data for Key West, 1972.

LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

KEY WEST, FLORIDA

A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

1972 U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ENVIRONMENTAL DATA SERVICE

NARRATIVE CLIMATOLOGICAL SUMMARY

Key West is located at the end of the Overseas Highway and near the western end of the Florida Keys, which are a chain of islands swinging in a southwesterly arc from the southeast coast of the Florida peninsula. The nearest point on the mainland is about 60 statute miles to the northeast, - while Cuba at its closest point is 98 miles south. The City occupies the island of the same name which is 3-1/2 miles long (ENE-WSW) and 1 mile wide. Its mean elevation is around 8 feet. The maximum elevation of 18 feet covers only about one acre in the western portion. Soil is a thin layer of sand, or marlfill, overlying a stratum of Oolitic limestone. Vegetation on the eastern end of the island is scanty, chiefly of low growth. The western end, where settlement and landscaping are older, has a little heavier growth. The airport and WBAS are located on the southeast shore on partially filled mangrove swamp.

The waters surrounding the key are quite shallow up to the mainland on the northeast and for 6 miles to the reef on the south. There is little wave action because the reef disrupts any established wave pattern.

Because of the nearness of the Gulf Stream in the Straits of Florida, about 12 miles south and southeast, and the tempering effects of the Gulf of Mexico to the west and north, Key West has a notably mild, tropical-maritime climate in which the average temperatures during the winter are only about 14° lower than in summer. Cold fronts are strongly modified by the warm water as they move in from northerly quadrants in winter. There is no known record of frost, ice, sleet, or snow in Key West. Prevailing easterly tradewinds and sea breezes suppress the usual summertime heating. Diurnal variations throughout the year average only about 10°.

Precipitation is characterized by dry and wet seasons. The period of December through April receives abundant sunshine and slightly less than 25 percent of the annual rainfall. This rainfall usually occurs in advance of cold fronts in a few heavy showers, or occasionally 5 - 8 light showers per month. June through October is normally the wet season, receiving approximately 53 percent of the yearly total in numerous showers and thunderstorms. Early morning is the favored time for diurnal showers. Easterly waves during this season occasionally bring excessive rainfall, while infrequent hurricanes may be accompanied by unusually heavy amounts. Humidity remains relatively high during the entire year.

METEOROLOGICAL DATA FOR THE CURRENT YEAR

Station KEY WEST, FLORIDA INTERNATIONAL AIRPORT Standard time used EASTERN Latitude 24° 33' N Longitude 81° 45' W Elevation (ground) 4 feet Year 1978

Month	Temperature: Averages: Daily maximum	Daily minimum	Monthly	Extremes: Highest	Date	Lowest	Date	Degree days (Base 65°): Heating	Cooling	Precipitation: Total	Greatest in 24 hrs	Date	Snow, Ice pellets: Total	Greatest in 24 hrs	Date
JAN	79.1	70.8	75.0	83	3	61	17	0	314	2.79	1.40	15	0.0	0.0	
FEB	76.3	67.4	71.9	81	3+	56	21	8	216	2.08	1.45	8-9	0.0	0.0	
MAR	80.0	70.8	75.4	84	31+	65	24	0	331	0.59	0.32	22	0.0	0.0	
APR	82.1	73.7	77.9	85	23+	66	3	0	398	0.78	0.62	1	0.0	0.0	
MAY	85.3	76.5	80.9	88	15+	72	6+	0	501	2.64	1.54	5-6	0.0	0.0	
JUN	85.4	77.1	81.3	89	30+	73	15	0	496	14.43	3.66	17-18	0.0	0.0	
JUL	88.0	79.1	83.6	90	4+	74	30	0	583	4.88	1.37	30	0.0	0.0	
AUG	88.7	80.1	84.4	90	29+	74	27	0	610	3.53	2.20	29-30	0.0	0.0	
SEP	87.9	77.9	82.9	90	7+	74	24+	0	544	8.70	1.88	23-24	0.0	0.0	
OCT	85.6	76.9	81.3	89	2	75	26+	0	511	0.74	0.32	3-4	0.0	0.0	
NOV	82.5	73.5	78.0	87	2	66	24	0	398	2.04	1.00	10	0.0	0.0	
DEC	78.3	68.9	73.6	84	14+	55	20	8	284	3.16	1.58	16	0.0	0.0	
YEAR	83.3	74.4	78.9	90	SEP. 7+	55	DEC. 20	16	5184	46.28	3.66	JUN. 17-18	0.0	0.0	

Month	Relative humidity Hour 01 (Local time)	Hour 07	Hour 13	Hour 19	Wind &: Resultant: Direction	Speed	Average speed	Fastest mile: Speed	Direction #	Date	Percent of possible sunshine	Average sky cover sunrise to sunset	Number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog	Temperatures: Maximum: 90° and above	32° and below	Minimum: 32° and below	0° and below	Average daily solar radiation - langleys
JAN	80	80	70	76	10	7.6	11.3	40	N	15	88	5.0	14	8	9	9	0	2	1	0	0	0	0	
FEB	74	77	65	70	07	4.4	12.2	30	NW	19	87	4.7	13	8	8	7	0	2	0	0	0	0	0	
MAR	71	74	60	67	10	4.5	11.2	23	NE	11	93	2.9	19	11	1	3	0	3	0	0	0	0	0	
APR	71	73	62	66	10	7.2	11.6	25	NE	27+	85	3.4	21	3	6	6	0	2	0	0	0	0	0	
MAY	73	73	64	67	08	1.6	9.0	34	E	6	82	4.1	15	12	4	8	0	4	0	0	0	0	0	
JUN	78	81	73	74	13	5.3	10.3	43	SE	18	61	6.6	9	7	14	18	0	8	0	0	0	0	0	
JUL	76	76	67	71	11	9.8	11.4	39	SE	20	80	6.0	9	12	10	13	0	11	0	3	0	0	0	
AUG	74	74	65	68	14	6.8	8.9	26	SE	11	78	5.3	10	15	6	9	0	14	0	10	0	0	0	
SEP	78	81	68	73	11	7.1	9.3	31	SE	11	77	5.3	9	12	9	19	0	14	0	2	0	0	0	
OCT	77	79	65	72	07	7.8	10.4	25	E	21	83	4.8	13	9	9	9	0	2	0	0	0	0	0	
NOV	79	80	71	76	08	5.1	10.4	30	S	13	71	6.3	2	17	11	8	0	4	0	0	0	0	0	
DEC	81	80	68	74	07	7.3	12.7	36	S	21	75	5.5	9	13	9	9	0	2	0	0	0	0	0	
YEAR	76	77	67	71	10	5.8	10.8	43	SE	JUN. 18	80	5.0	143	127	96	118	0	68	1	15	0	0	0	

NORMALS, MEANS, AND EXTREMES — BASED ON RECORDS FROM AIRPORT LOCATIONS FOR 1-1-45 TO 6-30-53 AND 7-1-57 TO DATE

Month	Temperature: Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal heating degree days (Base 65°)	Precipitation: Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets: Mean total	Maximum monthly	Year	Maximum in 24 hrs	Year
(a)	(b)	(b)	(b)	20		20		(b)	(b)	24		24		24		24	24		24	
J	73.7	65.4	69.6	85	1960+	46	1971	40	1.53	9.27	1958	0.03	1960	4.43	1955	0.0	0.0		0.0	
F	74.6	66.1	70.4	85	1952	47	1958	31	1.98	4.46	1965	0.02	1948	2.84	1966	0.0	0.0		0.0	
M	76.5	68.4	72.5	87	1949	53	1968	9	1.77	4.41	1958	T	1971	3.10	1968	0.0	0.0		0.0	
A	79.6	72.0	75.8	89	1965	55	1950	0	2.40	12.03	1948	0.00	1959	3.19	1950	0.0	0.0		0.0	
M	82.7	75.3	79.0	91	1953+	66	1960+	0	2.73	12.90	1960	0.12	1949	8.89	1960	0.0	0.0		0.0	
J	85.6	78.0	81.8	94	1952+	68	1961	0	3.97	14.43	1972	0.90	1948	4.00	1961	0.0	0.0		0.0	
J	87.4	79.1	83.3	95	1951	69	1952	0	4.10	11.69	1970	0.54	1961	3.05	1970	0.0	0.0		0.0	
A	88.0	79.1	83.6	95	1957	68	1952	0	4.33	11.34	1945	2.25	1969	3.28	1958	0.0	0.0		0.0	
S	86.5	78.1	82.3	94	1951	70	1960+	0	6.73	18.45	1963	1.70	1951	6.05	1963	0.0	0.0		0.0	
O	82.5	75.4	79.0	93	1962	60	1957	0	5.82	21.57	1969	0.74	1978	8.47	1971	0.0	0.0		0.0	
N	77.5	70.7	74.1	88	1964+	49	1959	0	2.80	9.01	1959	0.13	1961	7.33	1959	0.0	0.0		0.0	
D	74.5	66.7	70.6	85	1961	46	1962+	28	1.69	4.84	1959	0.18	1960	4.60	1959	0.0	0.0		0.0	
YR	80.8	72.9	76.8	95	AUG. 1957+	46	JAN. 1971+	108	39.99	21.57	OCT. 1969	0.00	APR. 1959	8.89	MAY 1960	0.0	0.0		0.0	

Month	Relative humidity Hour 01 (Local time)	Hour 07	Hour 13	Hour 19	Wind &: Mean speed	Prevailing direction	Fastest mile: Speed	Direction	Year	Pct. of possible sunshine	Mean sky cover, sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog	Temperatures: Max: 90° and above	32° and below	Min: 32° and below	0° and below	Average daily solar radiation - langleys
(a)	21	24	24	24	19	3	24	24		14	20	20	20	20	24	24	24	24	24	24	24	24	
J	81	83	69	77	12.1	NE	71	N	1958	70	5.0	11	12	8	7	0	1	0	0	0	0	0	
F	78	81	67	75	12.3	SE	63	NNW	1952	75	4.7	11	11	6	6	0	1	0	0	0	0	0	
M	77	79	66	73	12.5	SE	47	SW	1958	79	4.6	13	12	6	5	0	2	0	0	0	0	0	
A	76	77	64	71	12.6	ESE	48	NNW	1950	83	4.4	13	12	5	5	0	2	0	0	0	0	0	
M	76	76	65	71	11.1	ESE	51	E	1953	78	5.0	10	14	7	8	0	4	0	1	0	0	0	
J	79	78	69	74	9.9	SE	60	SE	1966	69	6.3	4	15	11	13	0	10	0	7	0	0	0	
J	77	76	66	71	10.2	ESE	92	ESE	1952	75	6.2	4	17	10	13	0	12	0	15	0	0	0	
A	77	77	67	73	9.4	ESE	96	S	1949	75	6.2	3	18	10	14	0	13	0	16	0	0	0	
S	79	80	69	76	10.2	ESE	122	NW	1948	67	6.6	3	16	11	17	0	11	0	7	0	0	0	
O	81	82	69	76	11.3	ENE	84	SE	1966	65	5.8	8	12	11	13	0	5	0	1	0	0	0	
N	80	82	69	76	12.0	ENE	76	NW	1947	70	4.9	11	12	7	7	0	1	0	0	0	0	0	
D	81	83	69	78	12.0	NE	47	N	1957	72	5.0	11	12	8	7	0	1	0	0	0	0	0	
YR	79	80	67	74	11.3	ESE	122	NW	SEP. 1948	73	5.4	102	163	100	113	0	62	1	47	0	0	0	

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows. Highest temperature 97 in August 1956, lowest temperature 41 in January 1886, maximum monthly precipitation 23.56 in October 1933; maximum precipitation in 24 hours 19.88 in November 1955.

(a) Length of record, years, based on January data. Other months may be for more or fewer years if there have been breaks in the record.
(b) Climatological standard normals (1931-1960).
* Less than one half.
+ Also on earlier dates, months, or years.
T Trace, an amount too small to measure.
Below zero temperatures are preceded by a minus sign.
The prevailing direction for wind in the Normals, Means, and Extremes table is from records through 1963.
& - 70° at Alaskan stations.

Unless otherwise indicated, dimensional units used in this bulletin are: temperature in degrees F.; precipitation, including snowfall, in inches; wind movement in miles per hour; and relative humidity in percent. Heating degree day totals are the sums of negative departures of average daily temperatures from 65° F. Cooling degree day totals are the sums of positive departures of average daily temperatures from 65° F. Sleet was included in snowfall totals beginning with July 1948. The term "Ice pellets" includes solid grains of ice (sleet) and particles consisting of snow pellets encased in a thin layer of ice. Heavy fog reduces visibility to 1/4 mile or less.

Sky cover is expressed in a range of 0 for no clouds or obscuring phenomena to 10 for complete sky cover. The number of clear days is based on average cloudiness 0-3, partly cloudy days 4-7, and cloudy days 8-10 tenths.

Solar radiation data are the averages of direct and diffuse radiation on a horizontal surface. The langley denotes one gram calorie per square centimeter.

& Figures instead of letters in a direction column indicate direction in tens of degrees from true North; i.e., 09 East, 18 South, 27 West, 36 North, and 00 Calm. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. If figures appear in the direction column under "Fastest mile" the corresponding speeds are fastest observed 1-minute values.

\# To 8 compass points only.

AVERAGE TEMPERATURE

Year	Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1933	72.8	74.4	73.8	78.6	81.8	80.8	84.0	83.4	82.8	78.9	72.2	72.4	77.9
1934	71.4	70.4	73.2	77.0	80.2	82.5	82.9	83.4	82.4	80.6	74.7	71.0	77.5
1935	69.7	69.3	75.2	78.4	82.1	83.8	82.8	84.0	82.4	79.1	73.8	65.7	77.2
1936	71.0	70.6	71.8	76.7	78.6	81.2	83.2	82.8	83.0	81.4	74.9	73.2	77.4
1937	77.0	72.6	72.9	76.8	78.8	82.0	82.9	83.8	82.2	78.8	72.8	68.6	77.4
1938	69.4	72.1	75.9	76.8	80.8	82.2	83.4	83.8	82.8	79.0	76.4	70.0	77.7
1939	71.8	75.4	70.6	76.9	79.5	82.2	83.6	83.2	83.1	80.2	72.6	69.4	77.9
1940	65.4	66.2	71.0	74.6	78.1	83.2	84.4	83.9	81.4	77.8	74.4	73.8	76.2
1941	69.4	66.8	69.4	73.8	78.0	83.2	84.2	85.0	83.1	81.6	76.3	75.1	77.3
1942	68.3	66.8	72.2	75.0	79.9	82.4	85.2	84.8	83.4	79.8	76.0	73.4	77.3
1943	72.5	68.8	73.4	75.6	80.4	82.9	85.0	84.8	83.6	78.2	73.2	69.9	77.4
1944	67.6	73.8	70.1	78.4	78.8	84.0	85.3	85.1	84.2	77.8	73.4	68.0	77.7
1945	69.0	73.1	77.2	79.9	79.8	83.2	83.4	83.5	82.4	79.5	72.9	70.4	77.9
1946	71.4	73.2	75.0	77.9	82.0	81.9	84.2	84.0	83.2	79.9	78.6	74.6	78.8
1947	75.5	67.5	71.2	80.3	80.6	82.9	82.9	83.6	82.5	79.0	78.5	73.3	78.2
1948	69.4	74.2	78.2	77.8	80.8	83.7	84.0	84.9	82.7	79.8	79.8	76.0	79.3
1949	73.5	76.2	74.0	78.6	80.8	82.8	83.5	83.7	82.9	80.4	72.3	72.7	78.5
#1950	74.8	72.7	74.5	74.3	81.5	84.9	84.5	84.0	82.9	80.8	73.5	68.9	78.0
1951	68.3	68.5	74.2	76.7	80.3	83.7	84.6	86.3	85.2	80.2	74.1	75.6	78.1
1952	72.9	70.5	76.4	75.9	81.0	83.9	83.3	84.5	83.2	78.7	75.3	69.2	77.9
1953	69.7	72.2	76.3	78.8	82.3	81.2	83.8	84.6	83.6	77.9	74.6	72.4	78.1
1954	71.8	71.1	71.6	78.6	80.1	82.5	84.3	84.6	82.9	78.8	73.3	68.4	77.3
1955	68.2	70.4	75.7	78.3	81.1	82.7	83.0	84.5	83.3	78.8	75.4	71.3	77.8
1956	67.9	74.4	74.1	76.7	81.9	82.6	85.6	86.6	82.0	79.8	72.7	73.9	78.2
1957	72.7	74.9	74.1	79.2	80.6	84.5	86.1	85.7	84.1	78.5	77.5	68.6	78.9
#1958	65.3	63.5	70.4	75.6	78.8	82.6	84.5	84.8	83.2	78.9	78.9	71.1	76.5
1959	68.5	77.1	73.3	76.9	80.1	82.4	83.1	83.8	82.5	82.5	75.5	68.8	77.9
1960	70.0	68.8	69.8	76.2	79.0	82.8	85.3	83.2	82.7	82.2	76.8	67.5	77.0
1961	67.0	71.8	75.7	76.4	80.5	82.6	84.9	84.9	83.0	79.3	76.3	72.5	77.9
1962	69.8	73.7	75.5	75.7	79.3	82.8	86.1	85.0	83.1	80.6	71.6	67.2	77.4
1963	70.3	68.9	75.4	76.8	79.6	83.4	84.9	85.0	83.8	78.4	74.0	66.7	77.3
1964	68.9	67.7	75.9	78.7	80.4	83.0	84.6	84.9	83.6	78.3	77.0	73.8	78.1
1965	71.3	75.2	76.6	80.3	81.5	84.1	85.2	85.1	83.2	80.2	76.6	71.9	79.3
1966	69.1	69.1	70.9	75.0	79.7	79.8	83.0	84.1	83.3	79.4	73.0	69.6	76.3
1967	72.5	71.4	75.9	79.1	82.8	84.3	86.8	84.3	83.9	79.7	75.1	74.4	79.2
1968	71.7	68.5	70.8	78.2	79.4	81.7	83.7	84.1	83.1	79.4	72.9	69.0	76.9
1969	70.2	68.2	68.9	77.4	80.6	82.7	85.3	84.9	83.0	80.3	72.6	69.2	77.0
1970	66.9	67.0	72.9	78.9	78.9	82.7	83.8	83.3	81.6	79.3	71.9	72.4	76.8
1971	70.6	71.9	72.4	75.9	80.7	83.0	84.1	83.2	82.7	81.1	75.8	76.2	78.2
1972	75.3	71.9	75.4	77.9	80.9	81.2	83.6	84.4	82.9	81.3	78.0	73.4	78.9
RECORD MEAN	70.3	70.9	73.3	76.5	79.7	82.4	83.8	83.9	82.6	79.2	74.6	70.9	77.3
MAX	74.8	75.9	78.3	81.5	84.6	87.4	89.0	89.2	87.8	83.7	78.9	75.6	82.2
MIN	65.2	65.9	68.3	71.5	74.7	77.3	78.6	78.5	77.4	74.7	70.2	66.3	72.6

TOTAL DEGREE DAYS

KEY WEST, FLORIDA

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
1933-34	0	0	0	0	0	0	5	0	4	0	0	0	9
1934-35	0	0	0	0	0	32	17	27	2	0	0	0	78
1935-36	0	0	0	0	2	40	16	8	6	0	0	0	72
1936-37	0	0	0	0	6	0	0	0	5	0	0	0	11
1937-38	0	0	0	0	8	32	23	2	0	0	0	0	65
1938-39	0	0	0	0	0	2	4	5	0	0	0	0	11
1939-40	0	0	0	0	6	4	96	42	8	2	0	0	158
1940-41	0	0	0	0	10	0	21	23	24	0	0	0	78
1941-42	0	0	0	0	0	0	34	42	16	0	0	0	92
1942-43	0	0	0	0	0	4	4	19	1	0	0	0	28
1943-44	0	0	0	0	0	26	23	0	0	0	0	0	49
1944-45	0	0	0	0	1	21	10	11	0	0	0	0	43
1945-46	0	0	0	0	8	8	18	2	0	0	0	0	36
1946-47	0	0	0	0	0	0	3	31	9	0	0	0	43
1947-48	0	0	0	0	0	0	31	3	0	0	0	0	34
1948-49	0	0	0	0	0	0	8	0	0	0	0	0	8
#1949-50	0	0	0	0	4	0	0	0	0	3	0	0	7
1950-51	0	0	0	0	8	13	31	33	0	0	0	0	85
1951-52	0	0	0	0	7	0	6	4	0	0	0	0	17
1952-53	0	0	0	0	0	22	14	4	0	0	0	0	40
1953-54	0	0	0	0	2	19	8	0	10	0	0	0	39
1954-55	0	0	0	0	0	25	32	20	0	0	0	0	77
1955-56	0	0	0	0	0	2	27	0	2	0	0	0	31
1956-57	0	0	0	0	9	6	3	0	3	0	0	0	21
#1957-58	0	0	0	0	0	30	55	103	15	0	0	0	203
1958-59	0	0	0	0	0	4	38	0	4	0	0	0	46
1959-60	0	0	0	0	15	7	43	23	27	0	0	0	115
1960-61	0	0	0	0	0	33	39	9	3	0	0	0	84
1961-62	0	0	0	0	0	20	24	2	1	0	0	0	47
1962-63	0	0	0	0	4	58	11	6	0	0	0	0	79
1963-64	0	0	0	0	5	27	31	29	0	0	0	0	92
1964-65	0	0	0	0	0	0	10	4	0	0	0	0	14
1965-66	0	0	0	0	0	1	27	26	4	0	0	0	58
1966-67	0	0	0	0	1	6	5	13	0	0	0	0	25
1967-68	0	0	0	0	0	1	5	10	17	0	0	0	33
1968-69	0	0	0	0	4	28	1	13	17	0	0	0	63
1969-70	0	0	0	0	0	15	47	19	2	0	0	0	83
1970-71	0	0	0	0	11	1	25	20	4	0	0	0	61
1971-72	0	0	0	0	0	0	0	8	0	0	0	0	8
1972-73	0	0	0	0	0	8							

TOTAL PRECIPITATION

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1933	0.28	0.79	[illegible]	0.39	1.47	10.92	3.30	4.90	3.12	23.56	3.79	0.37	52.02
1934	1.13	0.99	[illegible]	0.93	4.70	2.84	5.38	2.24	6.72	3.01	2.12	0.46	31.50
1935	1.91	0.40	[illegible]	1.64	3.50	2.62	10.38	4.16	9.69	2.21	5.14	0.98	39.62
1936	2.39	5.49	4.30	1.02	3.31	10.49	4.08	7.32	5.19	3.80	1.38	1.07	50.66
1937	0.86	3.32	1.18	0.13	9.63	6.06	6.11	4.34	8.01	4.58	1.28	3.82	44.29
1938	0.30	0.29	1.50	0.81	1.24	3.38	3.29	2.16	3.72	2.65	3.13	0.26	22.58
1939	1.79	2.49	0.08	7.46	2.71	1.97	3.59	3.73	3.28	11.83	5.13	3.70	42.12
1940	2.82	1.36	2.72	2.48	1.93	1.10	4.59	5.79	1.88	1.66	3.76	6.29	41.50
1941	1.17	6.24	3.12	13.16	0.16	1.82	3.11	2.57	4.99	4.72	7.59	3.46	52.31
1942	2.38	1.66	2.74	4.15	1.27	9.13	3.33	1.53	2.79	3.95	1.76	0.79	29.53
1943	0.71	0.49	2.66	1.21	1.71	6.64	1.72	2.56	6.35	7.95	6.20	1.49	30.33
1944	1.69	T	2.01	0.75	3.26	1.36	3.38	3.25	4.00	7.30	0.29	1.86	31.93
1945	0.34	3.09	0.34	1.14	0.06	3.67	8.59	9.42	6.06	6.24	3.63	1.19	43.93
1946	0.88	0.29	0.84	1.37	2.05	6.70	5.62	2.86	3.44	4.02	1.02	1.31	31.68
1947	1.75	1.17	3.06	1.17	1.05	6.31	13.06	3.89	6.72	12.46	2.91	3.46	58.31
1948	1.12	0.37	1.87	12.83	0.38	2.90	3.01	2.73	13.86	3.74	3.51	3.35	49.17
1949	2.39	0.06	0.61	1.86	1.01	4.66	4.98	4.25	8.46	3.68	2.30	1.99	33.26
#1950	0.36	2.81	1.73	2.33	1.13	3.22	2.83	7.05	9.56	6.29	2.56	1.95	38.87
1951	1.17	1.27	0.24	2.30	0.36	1.62	3.48	2.22	2.96	3.82	3.68	1.12	23.36
1952	2.52	3.23	0.47	2.47	0.74	3.38	6.59	2.49	4.36	7.39	3.66	3.67	32.87
1953	4.70	1.89	3.72	1.47	2.27	6.60	6.68	1.90	12.27	8.22	0.73	0.56	46.39
1954	0.33	4.29	2.90	5.63	2.94	3.28	1.63	5.12	5.75	1.39	20.98	0.81	56.85
1955	0.95	0.05	0.65	0.35	0.69	6.13	2.71	4.76	4.05	2.23	3.63	1.09	24.11
1956	0.27	1.50	0.01	0.12	2.42	1.85	3.62	1.24	11.19	0.87	0.22	0.15	20.46
1957	0.35	4.94	2.57	1.67	5.83	0.45	3.86	4.37	3.00	7.18	1.20	1.26	36.88
#1958	7.79	2.13	4.41	1.37	2.65	2.76	3.81	4.20	7.55	4.05	1.19	3.90	45.81
1959	0.92	0.06	2.66	0.00	2.32	5.17	4.13	2.81	8.50	2.45	9.01	4.84	42.67
1960	0.03	1.94	1.21	4.02	12.90	2.18	3.79	9.22	9.12	3.76	0.65	0.95	46.76
1961	1.25	4.42	1.28	1.79	2.37	5.60	0.54	2.07	1.71	2.74	0.13	0.78	22.54
1962	0.95	1.49	0.90	3.92	1.41	2.26	1.30	6.03	5.12	3.66	1.16	3.09	30.45
1963	1.89	1.77	3.03	3.23	3.41	4.29	1.53	7.15	18.45	1.82	6.14	1.36	47.24
1964	2.06	1.38	1.67	3.85	3.96	5.62	1.63	3.42	4.00	3.19	1.09	3.59	29.36
1965	1.35	4.46	3.57	0.64	0.69	2.45	2.94	2.26	10.59	6.47	3.46	1.05	33.13
1966	4.31	3.26	1.33	2.15	1.77	13.67	5.63	3.50	8.36	7.12	0.71	1.35	53.62
1967	3.76	1.79	0.59	0.02	7.67	5.57	2.53	3.98	4.96	5.63	1.38	4.00	34.38
1968	0.27	3.66	4.36	0.25	5.30	5.36	3.61	4.77	6.70	9.40	3.92	0.18	51.88
1969	3.35	1.34	3.85	3.03	3.02	3.96	4.19	2.25	10.21	21.37	1.50	3.79	52.92
1970	8.21	2.10	2.20	0.11	2.63	1.76	11.69	4.03	5.35	8.03	0.15	0.36	46.82
1971	3.41	2.76	T	3.24	4.37	2.77	4.80	9.03	5.47	11.12	1.69	1.59	44.25
1972	2.75	2.08	0.59	0.74	2.64	14.43	4.88	3.53	8.70	0.74	2.06	3.16	46.28
RECORD MEAN	1.79	1.68	1.43	1.60	2.49	4.46	3.69	4.48	6.68	5.89	2.29	1.74	38.32

TOTAL SNOWFALL

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total

Record mean values above (not adjusted for instrument location changes listed in the Station Location table) are means for the period beginning in 1871.

# Indicates a break in the data sequence during the year, or season, due to a station move or relocation of instruments. See Station Location table. Data are from City Office locations through February 1958 and Airport thereafter.

STATION LOCATION

KEY WEST, FLORIDA

Location	Occupied from	Occupied to	Airline distance and direction from previous location	Latitude North	Longitude West	Elevation above: Sea level: Ground at temperature site	Ground: Wind instruments	Ground: Extreme thermometers	Ground: Psychrometer	Ground: Telepsychrometer	Ground: Tipping bucket rain gage	Ground: Weighing rain gage	Ground: 8" rain gage	Ground: Hygrothermometer	Sea level: Pyranometer	Remarks
CITY																
Russell House, West Side Duval Street, between Front & Green Streets	11/01 70	11 30 70		24° 33'	81° 48'	3										Station established window shelter
Tift & Co. Building	12/01/70	7/31/71	2 blocks N	24° 33	81° 48'	2		16								Window shelter.
Duval Street between Front & Caroline	8/01/71	2 28 72	2 blocks S	24° 33'	81° 48'	3		18								Window shelter.
Louvre Hotel, South side Front between Duval & Fitzpatrick	3 01 72	2/28 82	1 block W	24° 33'	81° 48'	5	36	43	42		53					
Wall Building North side Front	3.01 82	3.30 86	Across St.	24° 33'	81° 48'	2	58	20	20		42					Fire destroyed office with city 3.30/86.
U. S. Naval Depot Building #1	4 12 86	12 31 86	2 blocks W	24° 33'	81° 48'	5	60	48*	46		56					* Poor exposure. Shelter on side of cupola type ventilator for ware room storing several thousand bales of tobacco. Maxima of 100° in June, July, and August 1886 regarded as too high.
Waite Building (Pierce Building) at Duval & Front	1 01 87	3 22 03	2 blocks E	24° 33'	81° 48'	2	50	42	41		46					
Weather Bureau Building Front & Eaton	3 23 03	9.30 11	600 yds. S	24° 33'	81° 48	6	53	11	11		3					Building damaged by 1909 and 1910 storms.
Island City Bank Bldg 205 Duval Street	10 01 11	1 22 13	500 yds NE	24 33'	81° 48'	3	50	41	41		32					Location while new observatory being built.
Weather Bureau Building Front & Eaton	1 23 13	3 28 50	500 yds. SW	24 33'	81 48'	6	64	10	10		[illegible]					
U. S. Post Office Bldg. Simonton & Caroline Streets	3 29 50	9/03 63	700 yds ESE	24 33'	81 48	9	35	5	5		40					Reduced to hurricane standby and climatological status 7 1 57
AIRPORT																
Easterly end of Key West Island Airways Station Building, 4 miles east of Post Office	8.26/31	11 02 42		24° 34	81 45	[illegible]	30	4	4				2			Operated by Airways Dept of Lighthouse Service, Department of Commerce until 1 25 37
Boca Chica Airport, 8 miles E of P. O. on U. S. Highway 1 in CAA Building	11 [illegible] 42	3 09/44	4 miles E	24° 35	81° 42	5	26	5	3				3			
Boca Chica Airport, 1st Floor Operations Bldg.	3 [illegible] 44	6 22 44	100 yds. W	24° 35	81 42	6	76	5	5				[illegible]			CAA Personnel and one Weather Bureau employee
Boca Chica Airport 2nd Floor, Operations Building above CAA	6 22 44	6 30 53	Immediate, above	24 35	81 42'	6	76	19	16				5			Airport Station with full complement established. Consolidated at WBO 6 30 53.
Key West International Airport	7 01 57	3 01 58	3 miles E of P. O.	24 33'	81° 45'	5	30	24	24			21	21			Airport Station re-established 7 1 57.
Key West International Airport	3 01 58	Present	Not moved	24 33'	81 45'	c4	a23	18	18		15	17	d15	b5		a - 25 feet to 6 9 64 b - Commissioned 350 feet NW of thermometer site 7 1 64. c - 5 feet to 7 1 64 d - Removed March 1971.

Requests for additional information should be directed to the National Weather Service Office for which this summary was issued.

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XI. ACKNOWLEDGEMENT

The measurement program and the data analysis described in this report involved many people. The conscientious effort and enthusiasm of the following people was essential for the successful outcome of the project: K. D. Anderson, M. L. Fontenot, L. J. Goodson, W. K. Horner, Dr. D. R. Jensen, and M. L. Phares.